	***WAPB Indiana Surface Water Programs*** **Quality Assurance Program Plan (QAPP)** ***B-001-OWQ-WAP-XX-23-Q-R5***

Office developing the QAPP: Office of Water Quality (OWQ)

Branch: Watershed Assessment and Planning Branch

Section: All

Federal ID number(s) of any direct grant funding:

Contract number(s) of any IDEM contract(s):
Pace Analytical Services, LLC, Contract # 53618 per RFP 21-66919, Expires 11/23/2023
Pace Analytical Services, LLC, Contract # 58463 per RFP 22-68153, Expires 3/4/2024
Eurofins Eaton Analytical LLC, Contract # 59543 per RFP 22-68153, Expires 6/15/2024

Original effective date: July 1996

Most current effective date: July 13, 2023
IDEM requires program QAPPs to be reviewed annually to confirm that the requirements of the data operation have not changed. Both project and program QAPPs should be immediately revised and re-approved if there are any changes to the goals, acceptance criteria, methodology, or analysis requirements. For project QAPPs, changes to the time or location also require revision.

QAPP Revision Number: *5*

QAPP author(s): Timothy Bowren

A. Project Management

The elements under this section address basic project management (e.g., project history and objectives, roles, and responsibilities of participants, etc.). These elements ensure that the project has a defined goal, that the participants understand the goal and the planned approach, and that planning outputs are documented.

A.1. Title and Approval Sheet

Ali Meils, Chief, Targeted Monitoring Section — Date: 6/28/2023

Stacey Sobat, Chief, Probabilistic Monitoring Section — Date: 6/28/2023

Caleb Rennaker, Chief, Technical and Logistical Services — Date: 6/28/2023

Kristen Arnold, Branch Chief
Watershed Assessment and Planning Branch — Date: 6/28/2023

Timothy Bowren, Quality Assurance Lead
Technical and Logistical Services — Date: 6/28/2023

Charles Hostetter, Quality Assurance Officer
Technical and Logistical Services — Date: 6/28/2023

Martha Clark Mettler, Assistant Commissioner
IDEM Office of Water Quality — Date: 7/13/2023

IDEM Quality Assurance Staff reviewer.

IDEM Quality Assurance Staff
Office of Program Support — Date: 7/21/2023

QAPP Summary:

The *Quality Assurance Project Plan (QAPP) for Indiana Surface Waters* has been prepared for environmental data collection for a wide variety of Watershed Assessment and Planning Branch (WAPB), OWQ, and other non-point source IDEM water quality monitoring programs. The structure and organization of the QAPP complies with the most recent 2006 “EPA Guidance for Quality Assurance Project Plans, EPA QA/G-5” (EPA/240/R-02/009); and provides a comprehensive description of several elements specified by the United States Environmental Protection Agency (U.S. EPA). The title and signature page and table of contents of this QAPP constitute the first two elements. The remaining elements provide the body of the QAPP.

It is envisioned that WAPB staff involved in water quality evaluation programs will use this QAPP to provide a format for environmental data collection targeted to achieve specific project data quality objectives (DQOs) and data usability by assigning one of four data quality assessment levels (DQAs) for regulatory decisions. This QAPP describes procedures that will be implemented to obtain environmental data of known quality that is adequate for the decisions to be made.

This QAPP is expected to serve as a guide to WAPB project officers, field personnel, and quality assurance staff charged with the collection and review of physical, chemical, biological, and microbiological water quality data. It is intended to provide guidance to both contract and state analytical laboratory staff charged with the analysis of OWQ environmental samples ~~(water, sediments, and biological)~~ in order to provide results that will meet the data quality objectives (DQOs) for the individual project. The QAPP is expected to satisfy U.S. EPA requirements for environmental data collection projects funded in whole or in part by U.S. EPA grants. Successful collection of precise, accurate, and complete data will provide IDEM and U.S. EPA with decisiveness that can be used to implement programs to improve and maintain water quality in the State of Indiana.

This revised QAPP represents additions and changes to the previous QAPP (Revision 4) approved internally by IDEM management in March 2017. The QAPP is expected to be updated or revised when significant changes to the programs described within the document occur or at a minimum of every five years. This QAPP will remain in effect until a new QAPP is updated and approved. Comments or suggestions regarding this document may be sent to:

Indiana Department of Environmental Management
100 North Senate Avenue
MC 65-40-2 (Shadeland)
Indianapolis, IN 46204-2251
Attention: Kristen Arnold, Branch Chief
Watershed Assessment and Planning Branch
Phone: (317) 308-3142; (800) 451-6027

QAPP Contact Information:

Laboratory contact information:

	Laboratory	Analytes and Sample Media
1.	Pace Analytical Services, Inc. Olivia Deck Commercial Laboratory Operations 7726 Moller Road Indianapolis, IN 46268 Phone: 317-228-3102 olivia.deck@pacelabs.com	General chemistries, nutrients, metals, organics in water and sediments
2.	Eurofins Eaton Analytical Inc (EEA) Jessie Brasch 110 South Hill Street South Bend, IN 46617 Phone: 574-472-5564 mailto:Jessie.Brasch@EurofinsET.com	General chemistries, nutrients, metals, organics in water
3	Indiana State Department of Health (IDOH) Environmental Laboratory Ray Beebe 550 West 16th Street Indianapolis, IN 46202 Phone: 317-921-5815 Rbeebe@health.in.gov	General chemistries, nutrients, metals, *E. coli,* organics in water
4.	Pace Analytical Services, LLC Tod Noltemeyer 1241 Bellevue Street Green Bay, WI 54302 Phone: (608) 232-2200 Tod.Noltemeyer@pacelabs.com	General chemistries, nutrients, metals, PFAS, organics in fish tissues and sediments

	Laboratory	Analytes and Sample Media
5.	IDEM OWQ, WAPB E. Coli Laboratory Michael Schneider 2525 N. Shadeland Avenue Bldg. 20 STE 100 Indianapolis, IN 46219 Phone: (317) 308-3201 mschneid@idem.in.gov	*E. Coli, total coliforms in water*
6.	Office of Water Quality Cyanotoxins Lab (OWQ-ML) Charlie Hostetter 2525 N. Shadeland Avenue Bldg. 20 STE 100 Indianapolis, IN 46219 Phone: (317) 308-3369 CJHostet@idem.IN.gov	*Cyanotoxins in water*

Contract laboratories use other IDEM approved subcontractors for chemical testing outside of their core capabilities.

- Laboratory accreditation and performance testing information:

  Laboratory contracts require accreditation by outside bodies and participation in at least annual performance studies which exists for the contracted lab methods and media. Typically, labs maintain accreditation with NELAP, A2LA, and other state accreditation bodies. Accreditation is usually renewed annually. Current Accreditation and recent performance studies completed are detailed in the annual IDEM Quality Assurance Annual Report to the U.S. EPA (section A.2). Accreditation information for contract labs utilized in 2023 and the current laboratory contract are listed in the table below.

2023 Contract Lab Accreditation			
	Current Lab Accreditations*		
Contract Lab	**Accrediting Body**	**Certification or Accreditation Number(s)**	**Expiration Date**
Pace Analytical Services, Indianapolis	NELAP- KS Dept. of Health; ISDH	E-10116; C-49-06	4/30/2023; 12/31/2023
Eurofins Eaton Analytical Inc (EEA)	NELAP – FL; ISDH	E87775; C-71-01	6/30/2023; 12/31/2023

2023 Contract Lab Accreditation			
	Current Lab Accreditations*		
Contract Lab	**Accrediting Body**	**Certification or Accreditation Number(s)**	**Expiration Date**
IDOH (aka ISDH)	EPA Region 5	LAB-10C (RadChem) SDWA	10/21/2023;
Pace Analytical Services, Green Bay	NELAP- FL Dept. of Health; WI DNR	E87948; 405132750	6/30/2023; 8/31/2023
Contract Lab Subcontractors:			
Pace Analytical Services, Minneapolis	NELAP - MN Dept. of Health ORELAP	2001911; MN3000001-0914	12/31/2023; 5/25/2023
Pace Analytical Services, Kansas City, KS	NELAP- KS Dept. of Health;	E-10146;	4/30/2023;
Eurofins Environment Testing North Central (EETNC aka TA-CHI) Chicago, IL	IN- ISDH; NELAP – IL;	C-IL-02; 1002012020-7;	4/29/2023; 4/29/2023;

A.2. Table of Contents

List of Tables

A.3. Distribution List

The IDEM staff listed in the table below will be notified by email and copied on the most recent version of this QAPP each time:

- This QAPP is revised and replaced by a more up-to-date version.

For a project QAPP, the final report on the findings is completed and the findings are submitted to data users and decision-makers. At that time, the QAPP document should be preserved as implemented and linked to the resultant data. (Project QAPPs are only effective one year for only a specific time and location.)

- For a program QAPP, this QAPP has passed its expiration date and is either replaced by a reauthorized version of this same QAPP or a revised QAPP, or the program under which this QAPP was implemented is ended. (Program QAPPs are effective for multiple years and repeated at numerous times or locations.)

Table 1: QAPP Distribution List

Name	QAPP Task(s)/Roles	Email
Jackie Adams	U.S. EPA Region 5	Adams.Jacqueline@epa.gov
Tera Fong	U.S. EPA Region 5/ Water Division	Fong.Tera@epa.gov
Kristen Arnold	WAPB Branch Chief	KArnold@idem.IN.gov
Martha Clark Mettler	IDEM OWQ Commissioner	MCLARK@idem.IN.gov
Paul McMurray	WAPB Integrated Reports Coordinator	PMCMURRA@idem.IN.gov
Jessica Weir	IDEM OWQ/WAPB E7 Aquatic Biologist	JWeir@idem.in.gov
Stacey Sobat	IDEM OWQ/WAPB/Probabilistic Monitoring Section	SSOBAT@idem.IN.gov
Angie Brown	IDEM OWQ/WAPB/Watershed Planning and Restoration Section	Abrown@idem.IN.gov
Caleb Rennaker	WAPB Technical and Logistical Section	CRennake@idem.IN.gov
Ali Meils	WAPB Targeted Monitoring Section Chief	AMEILS@idem.IN.gov
JD Sparks	IDEM OWQ/WAPB/Watershed Planning and Restoration Section – TMDL Coordinator	JDSparks@idem.in.gov
IDEM OWQ/WAPB staff	Project managers, sampling crews, data entry & data entry reviews	
Metcalfe, Jacqueline (Fran)	IDEM OLQ/Science Service	fmetcalf@idem.in.gov
Bharat Patel	IDOH Lab Supervisor, Inorganic Chemistry	Bpatel@health.in.gov
Mary Ann Hagerman	IDOH Director, Chemistry Division	mhagerma@health.in.gov
Tim Bowren	WAPB QA Manager– Review laboratory data results, manage lab contracts	TBowren@idem.IN.gov
Charles Hostetter David Jordan	WAPB QA staff – Review laboratory data results, manage lab contracts	CJHostet@idem.IN.gov DJordan@idem.IN.gov
Patrick Colcord	IDEM QA manager – QAPP review and approval	pcolcord@idem.in.gov
Lisa Love	Program area grant coordinator	llove@idem.in.gov
Jennifer Allen	IDEM grant coordinator, Finance Division (is required to report grant deliverables, like approved QAPPs, to U.S. EPA)	JLAllen@idem.IN.gov
Kathleen Mills	A representative of agency Office of Legal Counsel (OLC)	KMILLS@idem.IN.gov 317-232-3362

A.4. Project and Task Organization

Individuals or organizations with a role in this QAPP are identified below. Project specific workplans detail other key staff involved in a project.

Table 2: Key QAPP Individuals

Role	Name	Affiliation	Phone	Email
WAPB Branch Chief	Kristen Arnold	IDEM	(317) 308-3142	karnold@idem.IN.gov
Fixed Station Monitoring Project manager	Ali Meils	IDEM	(317) 308-3204	AMEILS@idem.IN.gov
TMDLs Program Manager	JD Sparks	IDEM	(317) 308-3178	JDSparks@idem.in.gov
Watershed Characterization Program Manager	Michaela Hecox	IDEM	(317) 308-3195	MHecox@idem.in.gov
Probabilistic Monitoring Program Manager	Mitchell Owens	IDEM	(317) 308-3135	mcowens@idem.in.gov
Reference Sites Program Manager	Cameron Yeakle	IDEM	(317) 308-3182	CYeakle@idem.IN.gov
Fish Tissues & Sediments Contaminants Monitoring Program Manager	Tim Fields	IDEM	(317) 308-3157	TFIELDS@idem.IN.gov
Autosamplers Program Manager	Michaela Hecox	IDEM	(317) 308-3195	Mhecox@idem.in.gov
Beach Monitoring Program Manager	Michelle Ruan	IDEM	(317) 308-3390	MRuan@idem.IN.gov
316(a) Thermal Discharge Investigations	Jessica Weir	IDEM	(317) 308-3157	JWeir@idem.in.gov
Special Projects	Michaela Hecox	IDEM	(317) 308-3195	Mhecox@idem.in.gov
QAPP lead, or project director	Timothy Bowren Charles Hostetter	IDEM	(317) 308-3181 (317) 308-3369	TBowren@idem.IN.gov CJHostet@idem.IN.gov

Role	Name	Affiliation	Phone	Email
Program area QA manager	Caleb Rennaker	IDEM	(317) 308-3119	CRennake@idem.IN.gov
QAPP development team;	Timothy Bowren Charles Hostetter	IDEM	(317) 308-3181 (317) 308-3369	TBowren@idem.IN.gov CJHostet@idem.IN.gov
Workplan Development Team	Individual Project Managers	IDEM		
QAPP field oversight Lead field auditors	Ali Meils Stacey Sobat	IDEM	(317) 918-0069 (317) 308-3191	AMEILS@idem.IN.gov SSOBAT@idem.IN.gov
Staff responsible for ensuring all involved staff have access to the most up-to-date version of the QAPP	Patrick Colcord	IDEM	317-234-8850	pcolcord@idem.in.gov
Integrated Report Coordinator	Paul McMurray	IDEM	(317) 308-3210	PMCMURRA@idem.IN.gov
Lead data reviewers	Tim Bowren David Jordan Charles Hostetter	IDEM	(317) 308-3181 (317) 308-3100 (317) 308-3369	Tbowren@idem.IN.gov Djordan@idem.IN.gov CJHostet@idem.IN.gov
Contacts for the contracted laboratories				
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Lab Project Manager	Olivia Deck	*Pace-Indy*	(317) 228-3102	olivia.deck@pacelabs.com
Lab Project Manager	Jessie Brasch	*Eurofins EEA – South Bend*	(574) 472-5564	Jessie.Brasch@EurofinsET.com
Lab Project Manager	Tod Noltemeyer	*Pace-WI*	(608) 232-3300 ext. 302	Tod.Noltemeyer@pacelabs.com

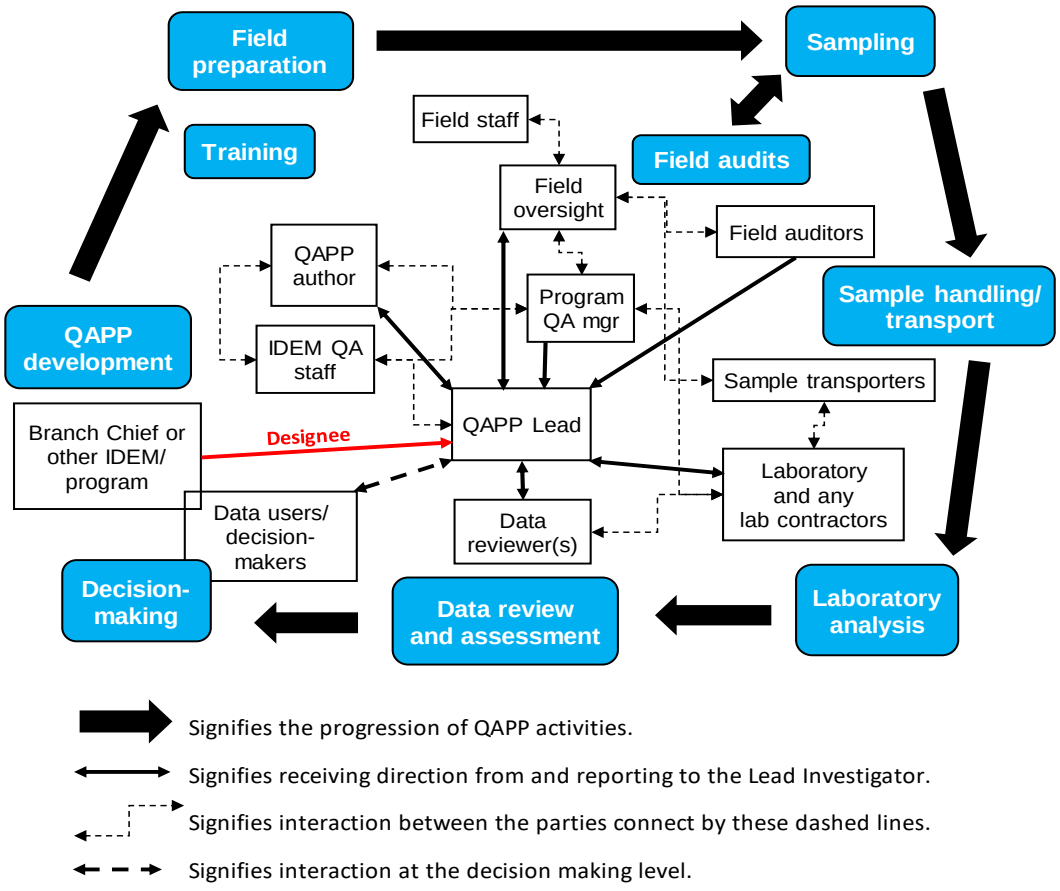
The organizational chart, “IDEM QAPP Lines of Authority,” shown below depicts the relationships and the lines of communication among the key project participants (listed

in the table above) throughout the various stages of this QAPP. This QAPP is a product of planning by the lead investigator, or project leader and a team of program area staff, which could include any of the staff depicted in the organizational chart, plus other program area staff with expertise in the topic of this QAPP.

Nearly all standard IDEM data operations (QAPPs) include the same basic staff relationships, with these primary exceptions:

- Some of the positions shown may be staffed by more than one person, or
- One person may staff more than one of the positions shown below.

IDEM QAPP Lines of Authority



Note: Staff requesting, developing, and implementing this QAPP should remain mindful of the importance of organizational and operational independence of QA staff with oversight and assessment responsibility for the preparation and implementation of this QAPP (data operation).

A.5. Background

A.5.1. The Study

The Office of Water Quality (OWQ) is responsible for reviewing and proposing revisions to Indiana's statewide water quality standards (WQS) as required by the 1977 Clean Water Act (CWA), as amended.

The WAPB is responsible for assessing the surface waters of the State of Indiana. These waters include approximately:

- 63,511 rivers and stream miles.
- 575 publicly owned inland lakes and reservoirs, with an aggregate surface area of 106,200 acres
- 154,000 acres (43 shoreline miles) of Lake Michigan.
- 813,000 acres of wetlands, mostly in the northern part of the state.

The Indiana Water Quality Monitoring Strategy (WQMS) 2022-2026 outlines the monitoring programs employed to collect the water quality data needed to meet IDEM's water management needs. It includes the ten elements recommended by U.S. EPA to meet the prerequisites of Section 106 of the federal Clean Water Act (CWA). The OWQ collects surface water quality data for the following purposes:

- To fulfill requirements of the CWA §305(b), §303(d), and §314 to assess all waters of the state to determine if they are meeting their designated uses and to identify those waters that are not.
- To support OWQ programs including water quality standards (WQS) development, National Pollutant Discharge Elimination System (NPDES) permitting, and compliance.
- To support public health advisories and address emerging water quality issues.
- To support watershed planning and restoration activities.
- To determine water quality trends and to evaluate the performance of programs.
- To engage and support the Hoosier Riverwatch and other volunteer monitoring networks across the state.

Environmental sample collection from waters, sediments, and fish tissues and their analyses for various pollutants to support water quality monitoring activities is an ongoing effort in the Watershed Assessment and Planning Branch (WAPB) and OWQ. The following monitoring programs are employed to achieve the above objectives:

- Probabilistic monitoring in one basin per year on a 9-year rotating basin cycle.
- Fixed Station monitoring at 165 sites across the state (2 added in 2014 for Natural Resource Conservation Service (NRCS) National Water Quality Initiative (NWQI).
- Fish tissue and sediment contaminants monitoring on a 5-year rotating basin cycle.

- Targeted (watershed characterization) monitoring for Total Maximum Daily Load (TMDL) reassessments and development, watershed baseline planning, and performance measures determinations.
- Cyanobacteria monitoring of 19 lakes.
- Special studies and remediation follow-up sampling.
- Reference Site Monitoring
- Thermal verification studies.
- Hoosier Riverwatch (HRW) program citizen volunteer monitoring.

The state is divided geographically into nine major river basins for the purpose of probabilistic sampling, analysis, and assessment of surface water quality. Each of the major river basins and the associated watersheds are shown in **Figure 5.1.** Water quality assessment of the entire state is expected to be completed by 2030. A complete listing of each major river basin and the targeted year for assessment of water quality scheduled in each river basin is as follows:

Major River Basin	**Assessment Year**
White River Basin, East Fork	2022
Great Miami River Basin	2023
Upper Wabash River Basin	2024
Lower Wabash River Basin	2025
Upper Illinois River (Kankakee) Basin	2026
Great Lakes Basin	2027
Ohio River Tributaries	2028
White River Basin, West Fork	2029
Patoka River Basin	2030

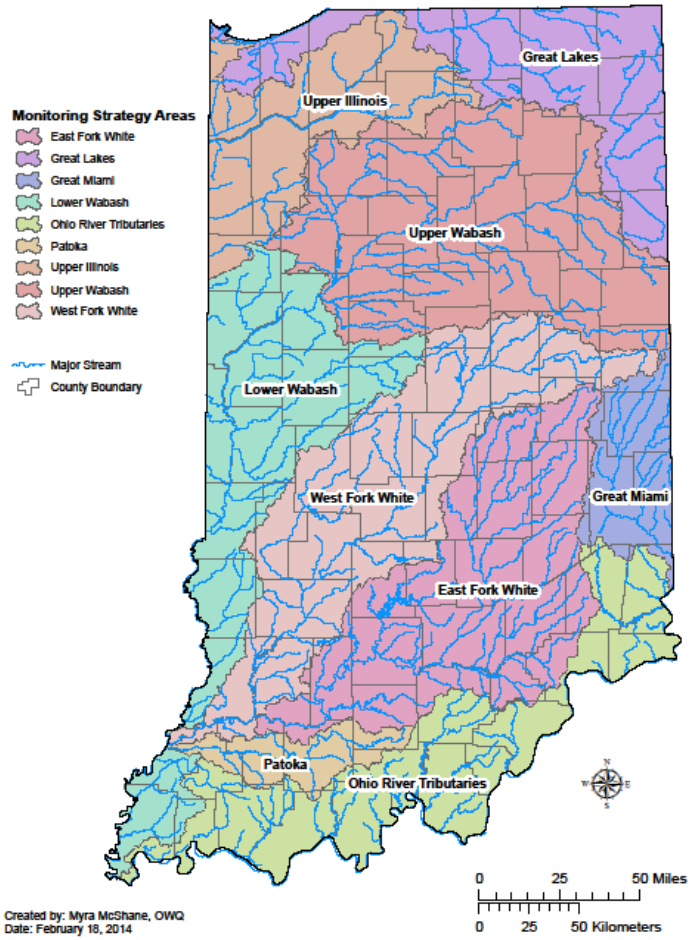
Thereafter, per the design strategy, sampling, analyses, and water quality assessment of each major river basin is to be conducted once every nine years as shown above.

Watershed characterization studies conducted by the WAPB for nonpoint source watershed planning projects are funded with CWA § 319 grant funds and state funds. All laboratory analyses for NPDES permit support are state funded. All other WAPB programs are funded by a federal Performance Partnership Grant (PPG) with state matching funds.

A majority of chemical and microbiological analyses for surface water quality monitoring programs are performed either by state-accepted contract laboratories, the Indiana Department of Health (IDOH) Laboratory, or IDEM's *E. coli* mobile laboratories. Parameters measured and data quality objectives and assessments for these programs and projects are covered by this QAPP to document data quality objectives and assessments for the programs. Likewise, special projects in the WAPB are included in this QAPP to produce data of known quality for regulatory decisions.

The most recent information on surface water quality, National Pollutant Discharge Elimination System (NPDES) point source monitoring, the nonpoint source water pollution control program, and various other environmental data collection activities may be found in the biennial *"Indiana Integrated Water Monitoring and Assessment Report: 2022*" (IR).

Figure A5.1
Indiana's Major River Basins and Watersheds of the Monitoring Strategy



A.6. Project or Task Description

This section provides a detailed overview of all work to be performed, products to be produced, and the schedule for QAPP implementation necessary to resolve the problem(s) addressed in A.5.

A brief description of the individual water quality monitoring programs and intended data uses is presented below:

A.6.1. Fixed Station Monitoring Program

Purpose

The primary objective of this program is to gather ambient physical, chemical, and bacteriological water quality data at fixed sites that are sufficient quality to be used to determine long-term water quality trends.

Secondary objectives include providing data to:

- calibrate and verify waste load allocations for NPDES permits;
- make water quality assessments;
- help develop TMDL documents;
- help with watershed planning documents; and
- to collect data at drinking water intakes from a subset of sites on Lake Michigan.

Data Collected

Under this program, 165 locations statewide (see details in the project workplan) are sampled monthly for up to 80 parameters (see Table B4.1.1), including numerous metals, organics, nutrients, and *E. coli* bacteria enumeration. The selection of parameters to be tested at each sampling location is based on consideration of potential sources of pollution, matrix, and intended data use. Nearby United States Geological Survey (USGS) gauging stations (which are within 10% drainage area of the fixed station) are used for flow data where possible to provide the necessary data for loading calculations.

A.6.2. Probabilistic Monitoring Program

The objective of this program is to provide a statistically valid assessment of overall water quality of rivers and streams within each major river basin in Indiana using a nine-year rotating basin approach (Figure A5.2). This approach divides Indiana into nine river basins, with one basin sampled per field season. The probabilistic design involves sample site selection using a stratified random distribution weighted by Strahler stream order. Sites are selected by U.S. EPA

National Health and Environmental Effects Research Laboratory in Corvallis, Oregon. This statistical method requires sampling 38-50 locations within a given basin. The results are extrapolated to characterize water quality conditions for the entire basin. Over time, the data may be used to identify emerging trends in basin-wide water quality conditions.

The probabilistic monitoring design gathers a variety of biotic and abiotic parameters including the following:

- General water chemistry, dissolved metals, and nutrients collected three times (over three sampling events) from May through October.
- Diatoms collected during one sampling event from September through October
- Ambient *E. coli* concentrations with field chemistry collected once each week for five consecutive weeks April through October.
- Macroinvertebrate community including insects, crayfish, and mollusks collected once mid-July through October.
- Fish community collected once June through mid-October.
- Habitat evaluations completed after fish and macroinvertebrate sampling.

Each major river basin and the targeted year for sampling and assessment of biotic and abiotic parameters scheduled in each river basin is as follows:

Major River Basin	Sampling Year	Assessment Year
White River Basin, East Fork	2022	2023
Great Miami River Basin	2023	2024
Upper Wabash River Basin	2024	2025
Lower Wabash River Basin	2025	2026
Upper Illinois River (Kankakee) Basin	2026	2027
Great Lakes Basin	2027	2028
Ohio River Tributaries	2028	2029
White River Basin, West Fork	2029	2030
Patoka River Basin	2030	2031

Intended Data Use

The probabilistic monitoring design provides the information needed to assess the extent to which Indiana's rivers and streams support their designated aquatic life and full body contact recreational uses. More specifically, the results of this type of sampling provide information for the IDEM OWQ's *Integrated Water Monitoring and Assessment Report* (IR), total maximum daily load (TMDL) development, development of nonpoint source watershed management plans,

and some types of trend analyses. Data collected using a probabilistic design may also be used to identify potential compliance issues which may need further sampling. Various outside organizations, contractors, and government agencies also use these data.

Using data collected from the various monitoring programs, IDEM assigns each AU of a waterbody to a category, according to the Consolidated Listing Methodology (CALM), for listing in the biennial IR. The categories are as follows:

Category 1. The available data, or information, or both, indicate that all designated uses are supported, and no use is threatened.

Category 2. The available data or information, or both, indicate the individual designated use is supported.

Category 3. Insufficient information is available to determine whether the individual designated use is supported. Waters are listed in this category if there are no data or other information to determine whether the individual designated use is supported, or if the available data or information are not consistent with the requirements of Indiana's CALM.

Category 4. The available data or information, or both, indicate that the individual designated use is impaired or threatened, but a TMDL is not required because:

- **i.** A TMDL for one or more pollutants has been completed and approved by U.S. EPA and is expected to result in attainment of all WQS applicable to the designated use.
- **ii.** Other pollution control requirements are reasonably expected to result in the attainment of all WQS applicable to the designated use in a reasonable period of time. Consistent with the regulation under 40 CFR Part 130.7(b)(i),(ii), and (iii), waters are listed in this subcategory where other pollution control requirements required by local, state, or federal authority are stringent enough to achieve any WQS applicable to the designated use.
- **iii.** Impairment is not caused by a pollutant. Waters are listed in this subcategory if the designated use impairment is not caused by a pollutant but is instead attributed to other types of pollution for which a TMDL cannot be calculated.

Category 5. The available data or information, or both, indicate the individual designated use is impaired or threatened, and a TMDL is required.

- **i.** This subcategory constitutes the Section 303(d) list of waters impaired or threatened by one or more pollutants for which a TMDL is required. Waters are listed in this category if it is determined that a pollutant has caused, is suspected of causing, or is projected to cause, impairment of a designated use. Where more than one pollutant is associated with the impairment of a

single AU, the AU will remain in Category 5 for each pollutant until the TMDL for that pollutant has been completed and approved by the U.S. EPA.

ii. This subcategory constitutes the Section 303(d) list of waters that are impaired due to the presence of mercury or PCBs, or both, in the edible tissue of fish collected from the AUs at levels exceeding Indiana's human health criteria for these contaminants.

A.6.3. Watershed Characterization Program

Watershed characterization monitoring provides valuable data for the purposes of TMDL development and CWA § 319 watershed management planning. This intensive monitoring design allows for future comparisons to evaluate changes in the water quality within the watershed(s) studied. Selecting a spatial monitoring design with sufficient sampling density to accurately characterize water quality conditions is a critical step in the process of developing an adequate local scale watershed study.

For its watershed characterization studies, OWQ uses a modified geometric site selection process to get the necessary spatial representation of the entire study area. Sites within a watershed are selected based on a geometric progression of drainage areas starting with the area at the mouth of the mainstem stream and working upstream through the tributaries to the headwaters (typically sites ≥ 5 square miles). Monitoring sites are then "snapped" to the nearest bridge with additional sites located at pour points and, to the extent possible, sites of concern to the stakeholders.

Study areas are selected based upon TMDL development needs and where there is a successful CWA § 319 planning grant application. Due to staffing and laboratory constraints, no more than one watershed characterization study is ongoing within a calendar year with projects commencing in the fall (usually November). The watershed characterization monitoring project provides physical, chemical, and bacteriological data collected monthly for twelve months at the pour points and for the rest of the sites, April through October, which constitutes the recreational season. Biological data are collected once per year at each of the sites.

Intended Data Use

The water quality data collected through the watershed characterization monitoring provides the data needed to identify the sources and extent of impairment for TMDL development and for local watershed groups to designate critical areas and make management decisions for their watershed management plans. The rigor of this monitoring design supports future performance measures monitoring to determine if improvements in water quality have occurred due to

management and best management plan (BMP) implementation. For more detailed information, please refer to the most recent work plan.

A.6.4. Fish Tissues and Sediments Contaminants Monitoring Program

Bioaccumulative chemicals of concern are measured in the edible tissues of fish caught from surface waters to indicate the potential health risks associated with fish consumption. Sediment indicators augment this information. Both fish tissue samples and sediment samples are analyzed in the laboratory. Many of these pollutants occur in such low concentrations in the water column that they are usually below analytical detection limits. However, over time, they may accumulate in fish tissue to levels that are easily measured. Therefore, fish tissue results may also be used as indicators of pollutants that may be present in the waterbody at very low levels that would not be detected in water samples.

Supplemental fish tissue indicators may be analyzed when industrial, municipal, or other pollution is suspected, or if a core indicator shows a certain type of impairment. Fish tissue sampling continues to evolve over time as public concern regarding new and emerging contaminants in the environment grows. If OWQ decides in the future to investigate other contaminants of concern, the core and supplemental indicators identified in the WQMS will be modified accordingly.

A survey of streams, lakes, and rivers for contaminants in fish tissues within the state has been on-going for more than 30 years. The sampling schedule includes twenty-three fixed station program sites from the original fish tissue sampling network. In addition to the fish tissue sampling network, other sampling sites are targeted based on historical environmental problems, waterbody access, use for fishing, date of last sampling event, potential contaminant sources, and monitoring recommendations by other agencies and entities.

The state is geographically divided into nine major river basins for the purpose of contaminants monitoring, analysis, and assessment of surface water quality. Each year one or two major river basins and the associated watersheds are sampled. Fish tissue sampling basins are shown in Figure A5.2.

Each major river basin and the targeted year for sampling and assessment is as follows:

Major River Basin	Sampling Year	Assessment Year
White River Basin, East Fork, and Great Miami River Basin	2022	2023
Upper Wabash River Basin	2023	2024
Lower Wabash River Basin and Upper Illinois River Basin	2024	2025
Great Lakes Basin and Ohio River Tributaries	2025	2026
White River Basin, West Fork, and Patoka River Basin	2026	2027

Intended Data Use

- Data from the Fish Tissue Contaminants Monitoring program helps support the efforts of a variety of water management decisions throughout IDEM and among other agencies. These include the following: Determining the aquatic life use impairment for fish consumption, based on concentrations of total PCBs and mercury. The concentrations are ecological indicators in support of the Performance Partnership Agreement, Clean Water Act (CWA) § 305(b) reporting assessed waters, and CWA § 303(d) listing and reporting impaired waters. (Primary objective)

- Providing data for use by the Interagency Fish Consumption Advisory (FCA) work group supporting IDOH issuance, modification, or removal of fish consumption advisories for specific Indiana water bodies.
- Developing tools for regional assessment and classification of bioaccumulating contaminants in Indiana waters.
- Providing data supporting the understanding of the risks to piscivorous wildlife.
- Evaluating contaminant trends in fish.
- Understanding the presence of emerging contaminants in Indiana wild fish.

- Provides supporting data to other IDEM program areas (Site Investigations, NPDES, Natural Resource Damage Assessment)

A.6.5. Performance Monitoring

Performance measures monitoring to identify changes in water quality is conducted in areas where there is reason to believe improvements may have occurred due to activities such as the implementation of point source and nonpoint BMPs, hydrological restoration, riparian restoration and/or wetland mitigation and restoration.

Generally, study areas are selected based on where watershed management plans (WMPs) have been implemented and where BMPs have had sufficient time to provide a measurable effect on water quality. In addition to the practices installed through CWA § 319 or via implementation of a TMDL, IDEM consults with the Indiana Conservation Partnership (ICP) to identify watersheds where various Farm Bill, Clean Water Indiana, and Lake and River Enhancement cost-share funds have been used. These are mapped at the 12-digit scale and the IDEM § 319 Watershed Specialist provides further insight on activities, including social indicators, within the watershed. Analyses of AIMSII data are also completed for indications that an improvement has occurred. Performance measures monitoring is conducted on individual AUIDs with existing impairments.

The specific parameters to be monitored and the number of sampling sites vary depending on the type and spatial extent of the original impairment. Each stream segment may be sampled for general chemistry and nutrients, bacteria, and/or fish and macroinvertebrate communities depending on the type of impairment(s) identified.

The number of samples collected at each site and the sample frequency is consistent with the minimum data requirements described in IDEM's CALM for the listing and delisting of impairments on the 303(d) list. For more detailed information, please refer to the most recent work plan.

Intended Data Usage

OWQ uses these data to evaluate the performance of programs and to determine if water quality is improving. OWQ is required to submit five performance measure reports over a 5-year period to demonstrate satisfactory progress in its CWA § 319 program. Performance measures reports are posted on the website and may be found at: https://www.in.gov/idem/nps/what-is-nonpoint-source-pollution/make-a-real-difference.

A.6.6. Cyanobacteria and Cyanotoxin Monitoring

Cyanobacteria are common constituents of algal communities in lakes, and many are known to produce potent toxins, which are recognized as a potentially serious threat to human health. IDEM's cyanobacteria surveillance program is conducted statewide at twenty-two sites on nineteen IDNR public access beaches and one IDNR dog park lake. Samples are analyzed for the type and quantity of cyanobacteria present and for the following toxins which may be produced by certain types of cyanobacteria: microcystin, cylindrospermopsin (starting in July), anatoxin-a, and saxitoxin. (Table B.4.1.5).

For protection of human health from exposure to the cyanobacteria and any of the toxins, Indiana uses the World Health Organization (WHO) guideline level of 100,000 cells/ml or a microcystin toxin level of 8 parts per billion (ppb) for a recreation advisory. Beaches are closed if microcystin toxin reaches 20 ppb. Indiana uses 6 ppb of cylindrospermopsin consistent with WHO guideline value, 8 ppb of anatoxin-a, and 0.8 ppb saxitoxin for a recreation advisory, consistent with the state of Ohio recommendations. Beaches are closed if cylindrospermopsin toxin reaches 20 ppb. Toxin results are posted on the website weekly during the sampling season. Exact cell counts and toxin levels can be found in the "Test Results" section of the web site http://www.in.gov/idem/algae/. Swimming areas stay on the high cell count alert until the cell counts fall below 100,000. Sampling is conducted monthly from May through Labor Day with the frequency increased to biweekly for lakes where cyanobacteria densities are found to be greater than 100,000 cells/ml.

Intended Data Use

This program provides data for public health advisories through the IDOH, beach warnings and closings through the IDNR, and alerts for pet and livestock through the Board of Animal Health (BOAH).

A.6.7. Reference Site Monitoring Program

The Reference Site Monitoring Program provides physical, chemical, and biological data from reference sites that will be used to develop or refine the Index of Biotic Integrity (IBI) for aquatic assemblages as well as biological criteria for aquatic life use assessments. Reference sites are in areas with the least amount of anthropogenic disturbance (development, agriculture, roads, channels, dams, mines, and discharges) and are considered the most natural remaining areas within a specified geographic boundary. Ideally, reference sites should be sampled at least once every 10 years to monitor for changes in the biological expectations for “least disturbed condition” and possible revisions to biological criteria; therefore, IDEM will sample at least 20 reference sites (with a goal of 25) each year over a 10-year period to refine biological indices, water quality criteria, and possibly develop other assessment indicators and thresholds. Sampling began in 2015. We anticipate the first 10-year cycle to be completed in 2026. There was a break in sampling in 2017 to provide resources for the 2017 nutrient pilot project.

Intended Data Use

Sampling at reference sites includes a minimum of two biological communities (fish, macroinvertebrates, and/or diatoms), habitat evaluations, and at least in-situ water chemistry (ideally laboratory water chemistry parameters as well (B.4.1.6, B.4.1.8), similarly to the probabilistic program). After 10 years of reference site monitoring, water chemistry and habitat data will be used as a filter to validate reference site selection. Afterwards, biological expectations for “least disturbed condition” (best available condition given widespread disturbance) can be developed for the biological communities.

A.6.8. Thermal Verification Monitoring

In accordance with 327 IAC 5-7 and CWA § 316(a), NPDES dischargers may request alternative thermal effluent limitations (ATEL) for a discharge based on a demonstration that the proposed effluent limitations for temperature are more stringent than necessary for the protection and propagation of the receiving waterbody’s balanced, indigenous community (BIC) or balanced indigenous population (BIP) of shellfish, fish, and wildlife in and on the body of water. This means that a new or existing discharger may request an ATEL to the thermal effluent limitations otherwise imposed by IDEM based on the water quality criteria

for the receiving waterbody or the technology standards, using the results from a demonstration study they implement.

The objective of monitoring point source discharge thermal plumes is to independently determine if impairments are occurring to the biological communities downstream of the thermal discharge outfalls on rivers and lakes. This monitoring effort documents the current downstream discharge conditions, determines zones of recovery of biological communities, and establishes the instantaneous pattern of the outfall thermal discharge plume by gathering biological (fish and macroinvertebrate), chemical, and habitat quality data. For determination of “no harm” to BIC, sampling is conducted on up to three (3) sites per year for fish community and one site for macroinvertebrate community (weather, environmental, and health and safety conditions permitting) during the period of the discharger’s NPDES permit.

Intended Data Use

The information gathered from these studies support NPDES industrial permit decision making processes for the issuance of ATELs for permitted thermal discharges. For more detailed information, please see the most recent work plan.

A.6.9. Special Projects

Special projects are limited in scope and designed to provide specific data for IDEM decision makers. The descriptions for individual special projects are described in individual sampling and analysis workplans.

Intended Data Use

Data use varies based on the data quality objectives of the special project and is described in the individual sampling and analysis project workplans.

A.6.10. Sampling Plan

Plans for sample and data collection for the individual surface water quality monitoring projects are revised annually based on results from the previous field season. A comprehensive project schedule for all water quality monitoring programs is illustrated in **Table A6.1-1.**

A.6.11. Table A6.1-1
Annual Project Schedule

	Activity Started (Time to complete in months)									
PROGRAMS	Historical data collection and review prior workplans	Write sampling workplan	Prepare equipment and personnel for field sampling	Field data collection	Receive results-assess and determine usability	Evaluate data and write reports	Use results for assessment decisions	Provide data to users	Plan for next round of data and sample collection	Total Time from Start to Completion
Fixed Station Monitoring	November (1)	April (1)	April-May (2)	Monthly (12)	June (12)	November-March (6)	November-March (6)	November-March (6)	November-March (6)	April-June (14)
Watershed Characterization	March-May (3)	June-September (4)	September-October (2)	November - October (12)	December-November (12)	December-March (4)	April-May (2)	April-May (2)	May-September (4)	March-May (15)
Fish Tissues and Sediments Contaminants Monitoring	May (1)	May (1)	May-June (2)	July-October (4)	September (12)	November (12)	December (1)	December (1)	December (1)	May-December (20)
Probabilistic Monitoring	November-December (2)	January - March (3)	November-March (5)	April-November (8)	April-March (12)	June-March (10)	April-May (2)	April-May (2)	November-March (6)	November-March (19)
Performance Monitoring	August-December (5)	January-March (3)	November-March (5)	April-November (8)	April-March (12)	June-March (10)	April-May (2)	April-May (2)	August-December (5)	August-December (17)
Cyanobacteria and Microcystin Monitoring	March (1)	April (1)	April-May (2)	May-August (4)	May-September (5)	May-September (5)	May-September (5)	May-September (5)	September-October (2)	March-October (8)
Reference Site Monitoring	November-December (2)	January - March (3)	November-March (5)	April-November (8)	April-March (12)	June-March (10)	April-May (2)	April-May (2)	November-March (6)	November-March (19)
Special Projects	March (1)	April (1)	April-May (2)	May-October (6)	June-November (6)	November-March (6)	November-March (6)	November-March (6)	November-March (6)	March (12)

Specific Sampling Locations

Site locations and parameters are described in the individual project workplans.

Quality Objective and Criteria

This QAPP will measure and attempt to address the statistical variability of the data gathered, as part of its findings following the data quality objective process described below.

Performance, Acceptance, and Decision Criteria

(*Step 6 of U.S. EPA's recommended data quality objective (DQO) process*)

A.6.12. Data Quality Objectives

The data quality objective (DQO) process is a planning tool for data collection activities. The DQO is a seven step systematic process. It provides a basis for data collection activities that support decision making. The seven steps or elements of DQO as defined by U.S. EPA ("Guidance on Systematic Planning Using the Data Quality Objectives Process – EPA QA/G-4", Section 0.7, U.S. EPA, EPA/240/B-06/001, 2006) are:

1. Description of the Problem
2. Decision for the Data Collection
3. Identify Input to the Decision
4. Define Boundaries for the Study
5. Develop a Decision Rule
6. Specify Performance or Acceptance Criteria
7. Develop the Plan for Obtaining Data

Data Quality Objectives (DQOs) are qualitative and quantitative statements that specify study objectives and acceptable criteria for the collection, evaluation, or use of environmental data. As such, each water quality monitoring program with its various data uses may require different levels of data quality. Moreover, each water quality monitoring program has separate goals addressed through specific tasks and projects. This QAPP is intended for all the surface water quality monitoring programs. Therefore, a comprehensive description of DQOs for all the water quality monitoring programs is beyond the scope of this QAPP. Comprehensive descriptions are provided in individual project work plans. Instead, specific details related to the seven steps of DQOs will be listed in the respective sampling and analysis workplan for each water quality monitoring program and project. The program and project goals as representative of DQOs common to each of the eleven Indiana surface water quality monitoring programs are listed below.

Program and Project Goals

Fixed Stations Monitoring Program:	**Representative DQOs**
• The objective of this program is to gather water quality data that can be used for Clean Water Act assessments, permitting and compliance programs, determining long-term water quality trends, watershed characterization, and in limited cases to determine source water quality.	• Determine ambient concentrations of physical, chemical, and *E. coli* parameters for trend analysis over time for overall assessment of water quality. • Monthly collect and analyze water samples from fixed station locations statewide. Specific parameters are selected after consideration of potential sources of pollution, matrix, and intended data use. • Each year, 165 sampling locations statewide are sampled monthly. Nearby USGS gaging stations are used for flow measurements for pollutant load calculations. • The information is used in determining background data for pollutants and future pollution abatement activities. Information gathered from this program is published in the state biennial IR. • These data are used in wasteload allocation models for NPDES permits. • The optimum design is monthly sampling from 165 fixed station locations statewide.

Program and Project Goals

Probabilistic Monitoring Program:	**Representative DQOs**
• This program provides an evaluation of stream water quality, biological integrity and habitat evaluation by sampling water chemistry, bacteria, , macroinvertebrates, diatoms, and fish communities.	• Determine if designated uses and/or WQS are being met in each major river basin. Impaired waterbodies are placed on the 303(d) List of Impaired Waters. • Conduct the water quality, biological communities, and habitats assessments of randomly selected sites in a major river basin. Sample sites are selected using a stratified random distribution weighted by Strahler stream order. Sites are selected by U.S. EPA National Health and Environmental Effects Research Laboratory in Corvallis, Oregon. • Watershed areas of the state are divided geographically into 9 major River Basins. Water quality assessment of each major river basin is conducted once every nine years. • The optimum design for this project is sampling at least 38 sites for the following: o General water chemistry, dissolved metals, and nutrients collected three times (over three sampling events) from April through November. o Diatoms collected during one sampling event from August through November. o Ambient E. coli concentrations with field chemistry collected once each week for five consecutive weeks April through October. o Macroinvertebrate community including insects, crayfish, and mollusks collected once mid-July through October. o Fish community are collected once June through mid October. o Habitat evaluations completed with fish and macroinvertebrate sampling.

Program and Project Goals

Watershed Characterization Program:	**Representative DQOs**
• Watershed characterization monitoring provides valuable data for the purposes of TMDL development and CWA § 319 watershed management planning. This intensive monitoring design allows for future comparisons to evaluate changes in the water quality within the watershed(s) studied. Selecting a spatial monitoring design with sufficient sampling density to accurately characterize water quality conditions is a critical step in the process of developing an adequate local scale watershed study.	• Waterbodies that assessed to be in violation of water quality standards (WQS) are listed on the 303(d) list of impaired waters with specific reference to pollutants of concern. These waterbodies require TMDL development to ameliorate the impairment. • The impairment of a waterbody is assessed from visiting the sites, sampling and analysis, and also by gathering historical data from different sources or entities. • Study areas are selected based upon TMDL development needs and where there is a successful CWA § 319 planning grant application. Due to staffing and laboratory constraints, no more than one watershed characterization study is ongoing within a calendar year with projects commencing in the fall (usually November). The watershed characterization monitoring project provides physical, chemical, and bacteriological data collected monthly for twelve months at the pour points and for the rest of the sites, April through October, which constitutes the recreational season. Biological data are collected once per year at each of the sites If an impairment is found to be in existence, a TMDL is developed to ameliorate the degradation. If the impairment is no longer in existence, the waterbody is delisted from the 303(d) list of impaired waters. • All assessments can be planned and executed to minimize data deficiencies and optimize conditions to gather data of known quality through implementation of proper QA/QC procedures. • The optimum design for the study varies between watersheds and depends on the data needs, as well as size of the study area and number of waterbodies.

Program and Project Goals

Fish Tissues and Sediment Contaminants Monitoring Program: • Monitor bioaccumulation of toxic pollutants in whole fish and in edible portions of fish tissues.	**Representative DQOs** • Provide scientific basis for developing the Fish Consumption Guidelines (FCGs) for protection of human health. Assess the concentration of contaminants in fish tissue. • Collect fish tissue data statewide from 23 national U.S. EPA CORE network stations in Indiana. • Determine if designated uses and/or mercury, PCB, and selenium WQS are being met in each major river basin. Impaired waterbodies are placed on the 303(d) List of Impaired Waters. • Watershed areas of the state are divided geographically into 9 major River Basins. Water quality assessment of each major river basin is conducted once every five years. • The optimum design is to sample at least once in five years as a minimum from one of the nine major river basins on a rotating basin schedule which also incorporates the sampling of 23 U.S. EPA CORE network stations.

Program and Project Goals

Performance Measures Monitoring: . • Performance measures monitoring to identify changes in water quality is conducted in areas where there is reason to believe improvements may have occurred due to activities such as the implementation of point source and nonpoint BMPs, hydrological restoration, riparian restoration and/or wetland mitigation and restoration.	**Representative DQOs** This monitoring activity requires that OWQ show improvements in water quality conditions in impaired watersheds that have resulted from watershed planning and restoration activities. • It is anticipated that the water quality data collected will highlight improvements in watersheds where waterbodies previously identified as impaired are now meeting water quality standards.

Program and Project Goals

	• Study areas are selected based on where watershed management plans (WMPs) have been implemented and where BMPs have had sufficient time to provide a measurable effect on water quality. In addition to the practices installed through CWA § 319 or via implementation of a TMDL, IDEM consults with the Indiana Conservation Partnership (ICP) to identify watersheds where various Farm Bill, Clean Water Indiana, and Lake and River Enhancement cost-share funds have been used. These are mapped at the 12-digit scale and the IDEM § 319 Watershed Specialist provides further insight on activities, including social indicators, within the watershed. Analyses of AIMSII data are also completed for indications that an improvement has occurred. • The number of samples collected at each site and the sample frequency is consistent with the minimum data requirements described in IDEM's CALM for the listing and delisting of impairments on the 303(d) list. Data is assessed as support/non-support for designated uses. If the watershed fully or partially supports designated uses, or can be statistically shown to be making improvements, or a weight of evidence indicates impending water quality improvement, the watershed is reportable under U.S. EPA's success measures. • All assessments can be planned and executed to minimize data deficiencies and optimize conditions to gather data of known quality through implementation of proper QA/QC procedures. • The optimum design is to conduct monitoring on previously impaired segments. The specific parameters to be monitored and the number of sampling sites vary depending on the type and spatial extent of the original impairment. Segments may be sampled for general chemistry and nutrients, bacteria, and/or fish and macro-invertebrate communities depending on the type of impairment(s) identified.

Program and Project Goals

Cyanobacteria and Cyanotoxin Beach Monitoring:	**Representative DQOs**
• The objective of this surveillance program for public lakes with recreational areas/beaches is to warn the public when cyanobacteria and cyanotoxins are present in large enough quantities to render recreation unsafe.	• Composite water samples will be collected at each swimming beach for cyanobacteria, cyanotoxin and nutrients. Composite samples from each beach swimming area are collected using the integrated water column sampler to better represent the cyanobacteria populations in the swimming area. All samples collected will be identified and enumerated. Samples will be analyzed for the cyanotoxins microcystin, saxitoxin, anatoxin-a, and cylindrospermopsin using the Gold Standard™ Diagnostic Test Kits. • Provide real-time data to IDOH and IDNR for issuing swimming beach advisories and closures for protection of human health. • The study areas will be chosen from lakes with swimming beaches managed by the IDNR.

Program and Project Goals

Reference Site Monitoring Program:	**Representative DQOs**
• This program provides physical, chemical, and biological data from reference sites that will be used to develop/refine the IBI for aquatic assemblages (including diatoms, macroinvertebrates, and fish) as well as biological criteria for aquatic life use assessments. • The objectives of this program are to: 1) Refine biological indices (e.g., the IBI) and water quality criteria using physical, chemical, and biological data collected from approximately 250 “least anthropogenically disturbed”	• Chemical and physical sampling data will be used to validate the absence of anthropogenic disturbance or a minimal level of allowed disturbance at reference sites; thus, each site will be evaluated as “supporting” or “non-supporting” when compared with water quality criteria. • Conduct the water quality, biological community, and habitat assessments of selected reference sites in two separate areas of the state to allow for sampling at least one region, regardless of weather or streamflow conditions. • Watershed areas of the state are divided geographically into major River Basins. Water quality assessment of each major river basin is conducted once every nine years. • Assess compliance or non-compliance to Water Quality Standards (WQS) in the watershed. Assess biological communities and habitats for intended waterbody uses. Waterbodies that are determined to be impaired for WQS are to be put on the 303(d) list

Program and Project Goals

reference sites (as determined by evaluating land use, water chemistry, and habitat quality) over a 10-year period. 2) Refine the list of reference sites every 10 years by using collected physical, chemical, and biological data.	of impaired waterbodies for TMDL development. All assessments are included in the state biennial 305(b) report to the U.S. EPA. • The optimum design for this project is sampling at least 20 sites 3 times for water chemistry, and biological communities and habitat assessment once during the summer sampling season.

Program and Project Goals

Special Projects:	**Representative DQOs**
• Objectives for each special project are detailed in the Sampling and Analysis Workplan for the project.	• DQOs are detailed in each project Sampling and Analysis Workplan.

Table 3: Performance, Acceptance, and Decision Criteria for this Study

Each Constituent or Parameter to be Measured	The DQIs (Selected from the PARCCs, listed in the notation below) for each Constituent or Parameter (List one DQI per line)	Performance, Acceptance, and Decision Criteria (the Measurement Quality Objective, or MQO) per Constituent,	Why this PARCCS was Selected as a DQI	Blank or QC Sample Type Used
Lab chemistry	Contaminants from the field sampling	< MRL		*Field blank*
Lab chemistry	*Contaminants from lab sample prep*	< MRL	Test Method QA/QC	*Lab blank*
Lab chemistry	*Precision*	RPD ≤ Control limits		*Field Duplicate*
Lab chemistry	*Precision*	RPD ≤ Control limits	Test Method QA/QC	*Lab Dups, MS/MSD*
Lab Chemistry	*Accuracy*	Recoveries within control limits	Test Method QA/QC	*MS/MSD, LCS, SS, IC, CC*
Lab Chemistry	*Sensitivity*	≤ 1/3 Water Quality Standard if applicable or best available technology	Required for 99% confidence	*Detection limit*
Lab Chemistry	Completeness	≥ 95% of possible results		*% of all planned samples actually taken*

Note: The DQIs (data quality indicators) in the second column of the table above are selected from the PARCCS (or data characteristics); Precision, Accuracy, Representativeness, Completeness, Comparability, and Sensitivity (aka Detection Limit). QC samples used to measure the data characteristics precision and/or accuracy are used to determine data variability. The other PARCCS measurements also can be used to establish the quality, or variability of collected data. QC sample blanks are used to determine whether samples have been contaminated.

A.7. Specialized Training and Certification

Specialized training or certifications needed by staff in order to successfully complete the specific project or task identified in this QAPP include:

Table 4: Specialized Training and Certifications Needed

Role	Required Training and Experience	Training References	Training Notes
All staff participating in sample collections	-Basic First Aid and CPR	-A minimum of 4 hours of in-service training provided by WAPB (IDEM 2010)	-Staff lacking 4 hours of in-service training or appropriate certification are always accompanied in the field by WAPB staff meeting Health and Safety Training requirements
	-Personal Protective Equipment (PPE) Policy -Memorandum "Use of Personal Flotation Devices (PFD) by Branch Personnel" dated February 29, 2000	-IDEM 2008 -February 29, 2000, WAPB internal memorandum regarding use of approved PFDs	-Indiana Code 14-8-2-27 requires a high intensity whistle and Safety of Life at Sea (SOLAS) certified strobe light when working on co-jurisdictional waters or during hours of darkness
	-IDEM Injury and Illness Resulting from Occupational Exposure Policy (IDEM 2016a)	-IDEM Hazard Communication (HazCom) Plan (IDEM 2019	
	-OWQ WAPB Laboratory Safety Plan (IDEM 2021)I		
	-Compliance with Indiana boating safety requirements	-State of Indiana Boating Safety Requirements (U.S. PS 2017) and the DNR approved online Boating Safety Course	-Staff lacking 2 years field experience are always accompanied in the field by WAPB staff meeting the boating safety requirements
Field crew chief	-DNR issued Scientific Purposes License		-At least one staff member on a field crew must obtain a license

A.8. Documents and Records

- IDEM QA staff post the most up-to-date versions of each agency QAPP and standard operating procedure (SOP) on the agency's extranet. All program managers are expected to direct staff participating in data operations/QAPP implementation to refer to the QA SharePoint page, Quality Assurance (QA) System Tools, to find the most up-to-date versions of all active IDEM QAPPs under Currently Active IDEM Quality Assurance Project Plans (QAPPs). All agencywide and program SOPs documenting QAPP activities are available on

the agency extranet page, Employee Resources, Standards, Policies, and Mailcodes, under Technical and Administrative SOPS (TSOP and SOP) . In addition, it remains the responsibility of the program staff with oversight roles designated in this QAPP to ensure that all participants are working from the same, most up-to-date version of this QAPP.

A.8.1. The QAPP Report

The following information associated with implementation of this QAPP can be accessed as follows:

- The QAPP and workplans under which work was done is stored in the IDEM QA library archives.
- SOPs referenced herein will be similarly stored so that current or future interested parties should contact the appropriate IDEM program area QA manager, or the IDEM QA manager, for date-specific copies of this QAPP and/or any SOPs referenced by it.
- All completed forms generated during implementation of the data operation are cataloged in a QAPP, or data report:
- Specific project information is detailed in the project work plan.

Table 5: Records Associated with *WAPB Surface Water QAPP*

Record Type	Where Records are Stored (name of database, directory, or storage drive [e.g., IDEM Virtual File Cabinet or program specific drive])	Document Title	Indexing Reference (pathway to the data/where to find the data)	Retention Periods
Completed project QAPP	Agency Quality Assurance Program - IDEM QA Library - Normal View - all documents (sharepoint.com)			
Sample collection forms	AIMS database		AIMS database	

Record Type	Where Records are Stored (name of database, directory, or storage drive [e.g., IDEM Virtual File Cabinet or program specific drive])	Document Title	Indexing Reference (pathway to the data/where to find the data)	Retention Periods
Field logs	Individual project files as detailed in project work plan. These files are additionally scanned and added as attachments to the project module in the AIMS database.			
Field recon forms	**Site Reconnaissance Form:** Information recorded on the Site Reconnaissance Form is entered into AIMS, goes through at least 2 rounds of data entry checks (QC) by someone other than the person entering the data. After data entry is finalized, the form and maps are scanned and uploaded into the AIMS database as a .pdf attachment to the Site. Maps should be included in the scan with color since some writing may be on the maps for accessing the site. The original hard copies can be recycled AFTER the electronic file is verified to be legible and attached to the site in AIMS. Note: Older site reconnaissance forms and maps were scanned and put into VFC by Project Name in AIMS (i.e., 2001 Corvallis Biological).			

Record Type	Where Records are Stored (name of database, directory, or storage drive [e.g., IDEM Virtual File Cabinet or program specific drive])	Document Title	Indexing Reference (pathway to the data/where to find the data)	Retention Periods
Chain of Custody Form (CoC), Sample Collection Request Form, Stream Sampling Field Data Sheets (SSFDS), Dissolved Reactive Phosphorus (DRP), and Algal Biomass Sheets**:**	Information recorded on the SSFDS, DRP, and Algal Biomass sheets is entered into AIMS, goes through at least 2 rounds of data entry checks (QC) by someone other than the person entering the data, and after finalized the status is changed to QARound2 for the analysis set in AIMS. The CoC, Sample Collection Request Form, SSFDS (DRP and Algal Biomass sheets) are scanned by analysis set and uploaded into AIMS with the appropriate naming convention. The original hard copies can be recycled AFTER the files are verified to be legible and attached to the project in AIMS. Note: Older SSFDS and Algal Biomass sheets were scanned together (not by analysis set) and put into VFC by Project Name in AIMS (i.e., 2001 Corvallis).			
EDI file from laboratory	S:\IGCN\OWQ\AIMS\EDI Files\EnChem\2021			
Related laboratory contracts	IDEM VFC	*Contract number(s) are listed on the front page of the QAPP*		

Record Type	Where Records are Stored (name of database, directory, or storage drive [e.g., IDEM Virtual File Cabinet or program specific drive])	Document Title	Indexing Reference (pathway to the data/where to find the data)	Retention Periods
Laboratory reports	IDEM Shared drive S:	Filenames include the Analysis set number and lab job number in title. Example: 22FSW107 SDG 18855 with C of C Final signed.pdf	Stored on S:\IGCN\OWQ\AIMS\EDIFiles\ in folders for the lab and project year. Example: S:\IGCN\OWQ\AIMS\EDIFiles\ISDH\2022 Fixed Station	10 years or until uploaded into VFC
QA reports	IDEM Shared drive S: S:\IGCN\OWQ\AIMS\QCreports and Sharepoint site Technical & Logistical Services - 2022 QA Reviews sharepoint.com)	Titles include the Analysis set number, lab name and report sequence number assigned by the QAO. Example: 22FSW107QCreport-112 NWB.docx	Stored in folders named for the project year	10 years or until uploaded into VFC
Completed project QAPP	Agency Quality Assurance Program - IDEM QA Library - Normal View - all documents (sharepoint.com)			10 years or until uploaded into VFC
Field audit reports	The field audit reports were put in a Shared Drive location that can only be accessed by Section Chiefs and the Branch Chief; however, the templates for field audits can be viewed on SharePoint at… Watershed Assessment & Planning > Branch SOPs in Development > Audit Checklists			10 years or until uploaded into VFC

Record Type	Where Records are Stored (name of database, directory, or storage drive [e.g., IDEM Virtual File Cabinet or program specific drive])	Document Title	Indexing Reference (pathway to the data/where to find the data)	Retention Periods
Fish Community Data Sheets	Information recorded on the data sheet is entered into AIMS, goes through at least 2 rounds of data entry checks (QC) by someone other than the person entering the data. After data entry is finalized, the data sheets are scanned and uploaded into the AIMS database as a .pdf attachment to the Project. The original hard copies can be recycled AFTER the electronic file is verified to be legible and attached to the Project in AIMS. Note: Older data sheets were scanned and put into VFC by Project Name in AIMS (i.e., 2000 Fixed Station).			10 years or until uploaded into VFC
Field Data sheets	Information recorded on the data sheet is entered into AIMS, goes through at least 2 rounds of data entry checks (QC) by someone other than the person entering the data. After data entry is finalized,			10 years or until uploaded into VFC

Record Type	Where Records are Stored (name of database, directory, or storage drive [e.g., IDEM Virtual File Cabinet or program specific drive])	Document Title	Indexing Reference (pathway to the data/where to find the data)	Retention Periods
Fish Tissue Data Sheets	Information recorded on the data sheet is entered into AIMS, goes through at least 2 rounds of data entry checks (QC) by someone other than the person entering the data. After data entry is finalized, the data sheets are scanned and uploaded into the AIMS database as a .pdf attachment to the Project. The original hard copies can be recycled AFTER the electronic file is verified to be legible and attached to the Project in AIMS. Note: Older data sheets were scanned and put into VFC by Project Name in AIMS			10 years or until uploaded into VFC

Record Type	Where Records are Stored (name of database, directory, or storage drive [e.g., IDEM Virtual File Cabinet or program specific drive])	Document Title	Indexing Reference (pathway to the data/where to find the data)	Retention Periods
Macroinvertebrate Lab Bench Sheets:	Information recorded on the data sheet is entered into AIMS, goes through at least 2 rounds of data entry checks (QC) by someone other than the person entering the data. After data entry is finalized, the data sheets are scanned and uploaded into the AIMS database as a .pdf attachment to the Project. The original hard copies can be recycled AFTER the electronic file is verified to be legible and attached to the Project in AIMS. Note: Older data sheets were scanned and put into VFC by Project Name in AIMS (i.e., 2000 Fixed Station).			10 years or until uploaded into VFC

Record Type	Where Records are Stored (name of database, directory, or storage drive [e.g., IDEM Virtual File Cabinet or program specific drive])	Document Title	Indexing Reference (pathway to the data/where to find the data)	Retention Periods
Qualitative Habitat Evaluations Index Data Sheets:	Information recorded on the data sheet is entered into AIMS, goes through at least 2 rounds of data entry checks (QC) by someone other than the person entering the data. After data entry is finalized, the data sheets are scanned and uploaded into the AIMS database as a .pdf attachment to the Project. The original hard copies can be recycled AFTER the electronic file is verified to be legible and attached to the Project in AIMS. Note: Older data sheets were scanned and put into VFC by Project Name in AIMS (i.e., 2000 Fixed Station).			10 years or until uploaded into VFC

Note: A table nearly identical to this one is part of the QAPP Report Template (See Appendix B, below) and is to be completed following the information documented here in Table 9, except of changes to any records management procedures that were subsequently modified from what is shown in here, once this QAPP was completed, approved, and being implemented in the field.

A.8.2. Field Activities

The Field Record for Surface water monitoring projects is included in Attachment 1. Completed field sheets are scanned and saved as an attachment to the project in AIMS. Blank field sheets are located on the IDEM SharePoint site. QA staff audit field data reduction, validation, and reporting procedures as a component of performance audits described in Surface Water QAPP Section C1.1, WAPB Field Performance and System Audits.

A.8.3. Laboratory Activities

IDEM's OWQ receives the analytical results from contract laboratories, the IDOH laboratory, OWQ Mobile labs, and the OWQ Cyanotoxins lab. The data is subject to the Laboratory Reporting Requirements in Table 3 of

section A.9.3, including receipt of data in the electronic data import specification (IDEM 2021b). Pace submits a laboratory report in electronic (PDF) format for each batch of samples (sample set) which consists of Contract Laboratory Chain of Custody Form (Attachment 2), spreadsheets of results, and the QC report in accordance with the contract requirements. In addition, the contract laboratory submits an electronic data import (EDI) file containing laboratory data and lab QC for each sample set. The EDI file must comply with this Surface Water QAPP. WAPB uploads the EDI files into the AIMS database. Data results in the laboratory reports shall meet requirements of DQA Level 3 or 4 in section D.3.2 in accordance with the project workplan. The Technical and Logistical Services Section receives the reports and edit files for review. Section D.3.1 contains additional information.

Table 6: Laboratory Reporting Requirements

Report Element
Report Date (date report is completed).
Documentation of IDEM/OWQ sample set number including: OWQ Analysis Set Number, IDEM/OWQ sampling date, receipt date.
Documentation of sample holding time summary, IDEM/OWQ sample identification number, Lab sample identification number.
IDEM/OWQ sample number cross reference with Laboratory internal identification number(s) and laboratory QA/QC results.
Sample analytical results, parameter name, CAS Number (Use the CAS Number assigned by IDEM if a unique CAS Number does not exist for the parameter), sample preparation dates, sample analysis dates & time, analytical and sample preparation methods, analytical and preparation batch numbers, dilution multipliers, method reporting limit (MRL) for the parameter. Adjust MRL for any individual sample dilutions.
Sample analytical result and MRL units. Results must be in the same units.
Method Reporting Limit (MRL) or Practical Quantification Limit (PQL) for each IDEM sample result and each QC sample result in the analytical run. If the MRL is different than the IDEM/OWQ required CRQL, then report the actual MRL (3.18 * Method Detection Limit).
Calculations and raw data including chromatograms, recorder charts, and spectrograms. (Maintained by contract laboratory for easy retrieval and review. Inclusion in reports is required only for DQA Level 4).
Results of QC check samples including blanks, duplicates, matrix

	spikes, matrix spike duplicates, QC standards, surrogates, internal standards, external standards, calibration standards, interference check samples.
	Calibration and tuning documentation.
	Case narrative indicating any deviations from the test method or SOP, unexpected or unusual results, out-of-limits QC check sample results.
	Explanations of any laboratory flags included in the report.
	ORIGINAL copy of IDEM/OWQ chain-of-custody forms and copy of IDEM/OWQ sample and test request form.
	Lab Identification and Contact Information.

A.8.4. QA Records and Reports

The IDEM principal project investigator ensures the appropriate project staff have the most current approved version of the QAPP. Keep QA, project, and site managers up to date on any revisions and edits made to the QAPP during the term of the project. The data report package shall include field logs available in hard copy and electronic formats. As with other project reports, store any QA records or reports generated in electronic format on the IDEM server shared drive (S Drive).

A.8.5. Retention Time and Location of Records and Reports

Retain all hard copy files of data and reports, for a minimum of three years, in accordance with the State of Indiana Records Retention Policy (General State of Indiana Schedule and the IDEM-specific schedule). Maintain hard copy records at the IDEM Shadeland office currently located at 2525 N Shadeland Avenue, Indianapolis, IN 46219. Store an electronic copy of all data files on the IDEM virtual file cabinet. Specific location of individual project records is detailed in the individual project work plans.

B. Data Generation and Acquisition

The elements under this section address all aspects of project design and implementation. Implementation of these elements ensure that appropriate methods for sampling, measurement and analysis, data collection or generation, data handling, and QC activities are employed and are properly documented.

B.1. Sampling Process Design (Experimental Design)

Sampling Design and Rationale (also referenced at A.6.1. and A.7.2.)

Sampling plan used (statistically random, judgmental, fixed, follow-up, etc.) and why the type of plan selected is appropriate for the questions to be answered.

Table 7a: What will be Sampled?

Because there are numerous variables of interest to the user for each sample taken, this table has been broken into several tables.

Target or Constituent(s) to be Sampled, Measured, and Recorded (add a separate row for each constituent)	Matrix from Which Sample will be Taken (add separate row for each matrix)	Units in Which Constituent(s) will be Measured	Sampling SOP/ Procedure to be Followed
	Water Samples:		**See Surface Water Monitoring Web Page**
Coliforms		MPN/100ml	
$TBOD_5$, $CBOD_5$, $TBOD_U$, $CBOD_U$,		mg/L	
Solids (Total and Dissolved), TS, TDS		mg/L	
Solids, Total Suspended, TSS		mg/L	
Alkalinity		mg/L	
General Chemistries, Br, Cl, F, SO_4		mg/L	
TOC, DOC		mg/L	
Dissolved Reactive Phosphorus (DRP), Dissolved Orthophosphate		mg/L	
Nutrients – Total Phosphorus, Ammonia, TKN, Nitrate+Nitrite, COD		mg/L	

Target or Constituent(s) to be Sampled, Measured, and Recorded (add a separate row for each constituent)	Matrix from Which Sample will be Taken (add separate row for each matrix)	Units in Which Constituent(s) will be Measured	Sampling SOP/ Procedure to be Followed
Cyanides		mg/L	
Metals, Dissolved		ug/L	
Metals, Total		ug/L	
Hardness (Calculated from Ca & Mg)		mg/L	
Cyanotoxins - Anatoxin-a, Saxitoxin, Microcystin (total), Cylindrospermopsin		ug/L	
Organics per EPA 525.3		ug/L	
Organics, Semi-Volatile, PCBs		ug/L	
Organics, Polynuclear aromatic hydrocarbons		ug/L	
Organics, Pesticides		ug/L	
Organics, Volatile		ug/L	
	Sediments	mg/Kg dw	
Solids, general chemistries		mg/Kg dw	
Grain size		%	
Specific Gravity		gm/ cm^3	
Acid Volatile Sulfide and Simultaneously Extracted Metals		mg/Kg dw	
metals		mg/Kg dw	
Nutrients & cyanide		mg/Kg dw	
Organics, BNA		mg/Kg dw	
Organics, Phenols		mg/Kg dw	
Organics, PAHs & SVOCs		mg/Kg dw	
Organics, VOCs		mg/Kg dw	
	Fish Tissues		
Lipids, moisture,		%	

Target or Constituent(s) to be Sampled, Measured, and Recorded (add a separate row for each constituent)	Matrix from Which Sample will be Taken (add separate row for each matrix)	Units in Which Constituent(s) will be Measured	Sampling SOP/ Procedure to be Followed
total PCBs, metals, pesticides, PFAS, PAHs		µg/kg ww	

Table 7b: Sample Characteristics

Target or Constituent(s) to be Sampled, Measured, and Recorded	Sample Volume[1]	Sample Container Size	Preservation Measures (chemical, temperature [ice], darkness)	Maximum Holding Time
Water Samples:				
Coliforms	120 mL	120mL,	Cool, <10 °C, 0.008% $Na_2S_2O_3$	8 hours including 2 hours for lab prep
$TBOD_5$, $CBOD_5$, $TBOD_U$, $CBOD_U$,	1 liter	1000 mL HPDE	Cool, ≤6 °C	48 hours
Solids (Total and Dissolved), TS, TDS	1 liter	1000 mL HPDE	Cool, ≤6 °C	7 days
Solids, Total Suspended, TSS	1 liter (Separate Bottle)	1000 mL HPDE	Cool, ≤6 °C	7 days
Alkalinity	1 liter	1000 mL HPDE	Cool, ≤6 °C	14 days
General Chemistries, Br, Cl, F, SO_4	1 liter	1000 mL HPDE	Cool, ≤6 °C	28 days
TOC, DOC	1 liter	1000 mL Amber Glass Boston Round	Cool, ≤6 °C, H_2SO_4 < pH 2	28 days
Dissolved Reactive Phosphorus (DRP), Dissolved Orthophosphate	250 mL	250 mL HDPE Brown	Frozen, filtered in field	6 days including 2 days for lab to prep

1 Samples with similar treatment, preservation, and storage can be combined except as noted

Target or Constituent(s) to be Sampled, Measured, and Recorded	Sample Volume[1]	Sample Container Size	Preservation Measures (chemical, temperature [ice], darkness)	Maximum Holding Time
Nutrients – Total Phosphorus, Ammonia, TKN, Nitrate+Nitrite, COD	1 liter	1000 mL HPDE	Cool, ≤6 °C, H_2SO_4 < pH 2	28 days
Cyanides	1 liter	1000 mL HPDE	Cool, ≤6 °C, NaOH to pH >10	14 days
Metals, Dissolved	1 liter	1000 mL HPDE	filtered in field then HNO_3 < pH 2	6 months
Metals, Total & Hardness (Calculated from Ca & Mg)	1 liter	1000 mL HPDE	HNO_3 < pH 2	6 months
Cyanotoxins - Anatoxin-a, Saxitoxin, Microcystin (total), Cylindrospermopsin	2 X 40 mL	40 mL Amber glass vials	10% buffer[2] for Anatoxin-a/Saxitoxin - separate vial)	14 days
Organics per EPA 525.3	2 X 1 liter	1000 mL Amber Glass Boston Round	Cool, ≤6 °C	14 days to extract, 40 days to run
Organics, Semi-Volatile, PCBs	1 liter	1000 mL Amber Glass Boston Round	Cool, ≤6 °C	7 days to extract, 40 after extraction
Organics, Polynuclear aromatic hydrocarbons	1 liter	1000 mL Amber Glass Boston Round	Cool, ≤6 °C, store in dark, 0.008% $Na_2S_2O_3$	7 days to extract, 40 after extraction
Organics, Pesticides	1 liter	1000 mL Amber Glass Boston Round	Cool, ≤6 °C, pH 5- 9	7 days to extract, 40 after extraction
Organics, Volatile	80 mL (2 vials)	40 mL Amber glass vials	Cool, ≤6 °C, 0.008% $Na_2S_2O_3$, HCl to pH 2	14 days
Sediments				
Fish Tissues				1 year

2 Buffer per Anatoxin-a ELISA Plate Insert (eurofins-technologies.com) or EPA Method 546 requirements.

Target or Constituent(s) to be Sampled, Measured, and Recorded	Sample Volume[1]	Sample Container Size	Preservation Measures (chemical, temperature [ice], darkness)	Maximum Holding Time
Lipids, moisture, total PCBs, metals, pesticides, PFAS, PAHs	100 grams tissue material	double wrapped and bagged samples	frozen, wrapped in foil, stored -80°C for long term storage and -26°C for temporary storage	Contract requires lab report in 90 days

This table is not inclusive and only includes the most frequently sampled parameters. Sampling, containers, preservatives, storage, and holding times are detailed in project workplans and individual test methods which are compliant with 40CFR Part 136 Table II requirements.

Table 7c: Sample Collection Schedule

Constituent or Characteristic	Frequency	Round 1 Date and Location	Round 2 Date and Location	Round 3 Date and Location
Per workplan	Per workplan	Per workplan	Per workplan	Per workplan

B.2. Sampling Methods

Procedures for collection of water, sediments, and fish tissues samples are described in the following procedure manuals. Each manual addresses equipment, sampling procedures, QC samples and frequency, containers, and calibration procedures. Sample containers, preservatives, and maximum holding times for water parameters cited in this QAPP shall comply with the requirements of **40 CFR part 136.3 (Table II)**. Sample containers, preservatives, and maximum holding times for sediment and fish tissues test compounds and parameters cited in this QAPP shall comply with the requirements of the applicable laboratory test method.

Procedure Manuals (SOPs)	Matrix and Data Collected
Water Chemistry Field Sampling Procedures B-015-OWQ-WAP-XXX-20-T-R0	Water samples collection. Water field data acquisition.
QAPP for Biological Community and Habitat Measurements B-003-OWQ-WAP-XXX-20-Q-R0	Fish tissue and sediment samples collection. Associated field data acquisition.

Table 8a: SOPs or Standard Scientific Methodologies

Because there are numerous variables of interest to the user for each method or SOP used, this table has been broken into several tables.

Method/ SOP #[6]	Name of Method or SOP	Doc Version Number	Document Location (extranet or internet address)
B-004-OWQ-WAP-TL-22-S-R1	AIMS Results Upload Template Instructions	R1	Agency Quality Assurance Program - IDEM QA Library - Normal View - all documents (sharepoint.com)
S-001-OWQ-WAP-PRB-20-T-R0	Calculation of Aquatic Life Use Support Estimates	R0	Agency Quality Assurance Program - IDEM QA Library - Normal View - all documents (sharepoint.com)
B-005-OWQ-WAP-XX-20-T-R1	Calculation of Drainage Area	R1	Agency Quality Assurance Program - IDEM QA Library - Normal View - all documents (sharepoint.com)
B-006-OWQ-WAP-XXX-21-T-R1	Calculation of Gradient	R1	Agency Quality Assurance Program - IDEM QA Library - Normal View - all documents (sharepoint.com)
B-014-OWQ-WAP-XXX-20-T-R1	Calibration of YSI Multi-parameter Data Sondes	R1	Agency Quality Assurance Program - IDEM QA Library - Normal View - all documents (sharepoint.com)
S-003-OWQ-WAP-TGM-23-T-R1	Collecting Surface Water Samples for Cyanobacteria and Cyanotoxin Analysis	R1	Agency Quality Assurance Program - IDEM QA Library - Normal View - all documents (sharepoint.com)
B-002-WAP-XX-23-T-R1	Cyanobacteria Identification and Enumeration	R1	Agency Quality Assurance Program - IDEM QA Library - Normal View - all documents (sharepoint.com)
S-001-OWQ-WAP-TGM-21-T-R4	Determination of Cyanobacteria Toxins in Ambient and Drinking Water by ELISA	R4	Agency Quality Assurance Program - IDEM QA Library - Normal View - all documents (sharepoint.com)
B-013-OWQ-WAP-XXX-23-T-R1	E-coli Field Sampling and Analysis	R1	Agency Quality Assurance Program - IDEM QA Library - Normal View - all documents (sharepoint.com)
S-004-OWQ-WAP-TL-20-T-R0	EDI Import to AIMS II	R0	Agency Quality Assurance Program - IDEM QA Library - Normal View - all documents (sharepoint.com)
B-009-OWQ-WAP-XXX-23-T-R1	Fish Community Field Collection Procedures	R1	Agency Quality Assurance Program - IDEM QA Library - Normal View - all documents (sharepoint.com)
B-055-OWQ-WAP-XXX-23-T-R0	Global Navigation Satellite System (GNSS) User Instructions B-055-OWQ-WAP-XXX-23-T-R0.docx	R0	Agency Quality Assurance Program - IDEM QA Library - Normal View - all documents (sharepoint.com)

Method/ SOP #[6]	Name of Method or SOP	Doc Version Number	Document Location (extranet or internet address)
B-001-OWQ-WAP-XXX-22-T-R0	Global Positioning System Data Creation	R0	Agency Quality Assurance Program - IDEM QA Library - Normal View - all documents (sharepoint.com)
EPA Guidance Document	Guidance for Assessing Chemical Contaminant	Volume 1	https://www.epa.gov/sites/default/files/2018-11/documents/guidance-
B-012-OWQ-WAP-XXX-23-T-R1	Hester Dendy HD Multiplate Artificial Substrate Macroinvertebrate Collection Procedure	R1	Agency Quality Assurance Program - IDEM QA Library - Normal View - all documents (sharepoint.com)
B-011-OWQ-WAP-XXX-23-T-R1	Multi-habitat (MHAB) Macroinvertebrate Collection Procedure	R1	Agency Quality Assurance Program - IDEM QA Library - Normal View - all documents (sharepoint.com)
B-004-OWQ-WAP-XX-18-T-R1	Phytoplankton and Periphyton Field Collection Procedures	R1	Agency Quality Assurance Program - IDEM QA Library - Normal View - all documents (sharepoint.com)
CSP2C01	Principles and Techniques of Electrofishing	NA	https://nctc.fws.gov/courses/CSP/CSP2C01/resources/
B-003-OWQ-WAP-XXX-23-T-R2	Procedures for Completing the QHEI	R2	Agency Quality Assurance Program - IDEM QA Library - Normal View - all documents (sharepoint.com)
B-002-OWQ-WAP-TGM-15-T-R0	Processing and Identification of Diatom Samples	R0	Agency Quality Assurance Program - IDEM QA Library - Normal View - all documents (sharepoint.com)
B-003-OWQ-WAP-XXX-20-Q-R0	QAPP for Biological Community and Habitat Measurements	R0	Agency Quality Assurance Program - IDEM QA Library - Normal View - all documents (sharepoint.com)
S-001-OWQ-W-TL-13-S-R0	Reviewing Nonpoint Source (NPS) Grantee QAPPs	R0	Agency Quality Assurance Program - IDEM QA Library - Normal View - all documents (sharepoint.com)
B-002-OWQ-WAP-PRB-23-S-R1	Site Reconnaissance Procedure	R1	Agency Quality Assurance Program - IDEM QA Library - Normal View - all documents (sharepoint.com)
B-015-OWQ-WAP-XXX-20-T-R0	Water Chemistry Field Sampling Procedures	R0	Agency Quality Assurance Program - IDEM QA Library - Normal View - all documents (sharepoint.com)

Table 8b: SOPs or Standard Scientific Methodologies History and Related Information

Method/ SOP # (continued from above table)	Method/SOP Source (IDEM, U.S. EPA, ANSI, NELAC)	Date Approved
B-001-OWQ-WAP-XXX-15-T-R0	IDEM	2015
S-004-OWQ-WAP-TL-20-T-R0	IDEM	2020
CSP2C01	U.S. FWS	2018
EPA Guidance Document	U.S. EPA	2000

Table 8c: SOPs or Standard Scientific Methodologies, Related Details

Method/ SOP # (continued from above table)	Equipment Used That Could Require Decontamination	Decontamination Process	Method for Disposing of Decontamination Product	Other
B-001-OWQ-WAP-XXX-15-T-R0	NA	NA	NA	
S-004-OWQ-WAP-TL-20-T-R0	NA	NA	NA	
CSP2C01	Watercraft, anodes, cathodes, nets, electrofishing gloves, PPE	Spray with 2% bleach solution	Safe to pour down the drain	
EPA Guidance Document	Watercraft, anodes, cathodes, nets, electrofishing gloves, PPE	Spray with 2% bleach solution	Safe to pour down the drain	

Table 8d: SOPs or Standard Scientific Methodologies; Sampling Details

Method/SOP # (continued from above table)	Sample Volume	Sample Preservation Type	Holding Time to Analysis	Other
B-013-OWQ-WAP-XXX-23-T-R1	100 ml	$Na_2S_2O_3$, iced	8 hours	*E. coli* & total coliforms
B-015-OWQ-WAP-XXX-20-T-R0	2 X 1000 ml	iced	2 days – 28 days	General Chemistries
B-015-OWQ-WAP-XXX-20-T-R0	1000 ml	Sulfuric Acid, iced	28 days	Nutrients

Method/SOP # (continued from above table)	Sample Volume	Sample Preservation Type	Holding Time to Analysis	Other
B-015-OWQ-WAP-XXX-20-T-R0	1000 ml	Nitric Acid	6 months	Metals
B-015-OWQ-WAP-XXX-20-T-R0	1000 ml	Sulfuric Acid, iced	28 days	TOC, DOC
B-015-OWQ-WAP-XXX-20-T-R0	500 ml	Frozen	4 days frozen 2 days for analysis	orthophosphorus
B-015-OWQ-WAP-XXX-20-T-R0	1000 ml	NaOH	14 days	cyanides
B-015-OWQ-WAP-XXX-20-T-R0	2 X 1000 ml	iced	14 days for extraction, 30 days for analysis	Organics for 525.3
S-003-OWQ-WAP-TGM-23-T-R1	2 X 40 ml	Iced, 10% buffer for Anatoxin-a/ Saxitoxin - separate vial	5 – 28 days	Cyanotoxins
B-015-OWQ-WAP-XXX-20-T-R0	1000 ml	Iced	2 days to prep	CBOD5, TBOD5, UBOD

Table 9: Types of Samples to Be Collected

Constituent(s)	Type of Samples (composite, grab, etc.)	Number of Samples Needed	Frequency of Sampling	Type and Number of QC Samples[7] (add a separate row for each constituent)
Fish Tissue	Composite	TBD	1 sampling event per site	1 per 20
Water Chemistry Sample	Grab	TBD	1-12 sampling events per site	1 per 20
Water Sample for Coliforms	Grab	TBD	5-12 sampling events per site	1 per 20
Water Sample for Cyanotoxins	Composite	TBD	1-2 times Monthly during recreation season	1 per 20
Fixed Station Samples	Grab	TBD	Monthly	1 per 20

[7]The general rule is that 5 percent of all samples should be quality control (QC) samples.

If there is a failure, disruption, or other breakdown in the implementation of the sampling plan:

What will be done? Corrective action will be taken and failures noted in reports.

The program manager is responsible for implementing the change or corrective action.

B.3. Sample Handling and Custody

The requirements for sample handling and custody in the field, laboratory, and transport are set forth in the following tables.

Table 10: Sample Handling in the Field

Sample Collection Location	Sample Constituent of Concern	Container Type and Size	Package Temperature or Special Condition	Additional Sample Handling Documentation Sources (SOP(s), etc.)
Detailed in Individual workplans	Metals	Per workplan	Room temperature	Per SOP for sample collection
Detailed in Individual workplans	Nutrients, organics, general chemistries, Coliforms, cyanotoxins	Per workplan	Iced	Per SOP for sample collection

Table 11: Sample Transport Details

Carrier (IDEM or commercial)	Means of Transport	Allowable Time from Collection Time to Lab	Days of the Week when Shipping is Unavailable
IDEM	State vehicles	0 to 7 days	weekends
Contract Lab courier	Contractor vehicle	0 to 7 days	Fridays, weekends

Table 12: Sample Handling in Laboratory

Lab Location	Lab Contact Info	Time Span Lab is Open for Sample Receipt	Samples are Stored Where and How, Until Analysis
Pace – WI, Green Bay, WI	Tod Noltemeyer – tod.noltemeyer@pacelabs.com	Monday through Wednesday	The laboratories store all samples at a maximum temperature of -10°C
Pace – Indy, Indianapolis, IN	Olivia Deck - Olivia.Deck@pacelabs.com	Monday through Friday	The laboratories store all samples at a maximum temperature of 6°C in accordance with method requirements

Lab Location	Lab Contact Info	Time Span Lab is Open for Sample Receipt	Samples are Stored Where and How, Until Analysis
IDOH Laboratory, Indianapolis, IN	Bharat Patel - Bpatel@health.in.gov	Monday through Friday	The laboratories store all samples at a maximum temperature of 6°C in accordance with method requirements
Eurofins – Eaton Analytical, South Bend, IN	Jessie Brasch - Jessie.Brasch@et.eurofinsus.com	Monday through Friday	The laboratories store all samples at a maximum temperature of 6°C in accordance with method requirements
IDEM Cyanotoxin lab, 2525 N. Shadeland, Indianapolis, IN	David Jordan, DJordan@idem.in.gov	Monday through Friday	frozen

The following agency or program area SOPs include additional information on sample package handling:

- *Contract laboratory Quality Assurance Plans*

Sample container labels, custody forms, and sample custody logs are available at:

- Labels: *Bottles are labeled with sharpie markers detailing sample identification and preservative.*
- Forms: *Printed from the AIMS II database or received as required from the contract lab project manager.*
- Logs: *Maintained by the project manager.*

The laboratory contact for information on sample receipt, storage, handling, and preparation is:

Lab contacts are detailed in QAPP Contact Information Section

Table 13: Sample Handling System (responsible person or laboratory group)

Sample Collection, Packaging, and Shipment
Sample Collection: Project field staff
Sample Packaging: Project field staff
Coordination of Shipment: Project field staff
Type of Shipment (Courier): Delivery to local lab or if lab is out of town, either shipping (UPS or FedEx) according to agreements with the lab and contract specifications.
Sample Receipt and Analysis
Responsible Organization: contract laboratory

Sample Collection, Packaging, and Shipment
Sample Receipt: contract laboratory personnel
Sample Custody and Storage: contract laboratory personnel
Sample Preparation: contract laboratory personnel
Sample Determinative Analysis: contract laboratory personnel
Sample Archiving
Field Sample Storage (# days from sample collection):
Sample Extract/Digestate Storage (# days from extraction/digestate):
Sample Disposal
Responsible Organization: contract laboratory
Responsible Personnel: contract laboratory personnel

B.4. Analytical Methods

Specific Sampling Parameters

B.4.1. Fixed Station Program Parameters:

Target compounds and parameters for specific sites are detailed in the sampling and analysis workplan for a Fixed Station Project. The parameters are chosen from the following tables.

Table B.4.1.1 Fixed Station Parameters

General Chemistries	CAS Number or OWQ Identifier[3]	Method[4]	IDEM CRQL (mg/L) [5]
Alkalinity (as $CaCO_3$)	E-14506	EPA 310.2	10.0
Chloride	16887-00-6	SM4500Cl-E	1
Fluoride	16984-48-8	EPA 340.2	0.1
Cyanide (Total)	57-12-5	EPA 335.4	0.01
Cyanide (Weak Acid Dissociable)	57-12-5	SM4500CN- I	0.01
Cyanide (Amenable to Chlorination)	57-12-5	SM4500CN-G	0.01
Hardness (as $CaCO_3$)	E-11778	EPA 130.1	1
Solids, Dissolved Total (TDS)	E-10173	SM2540C	10.0
Solids, Suspended Total, (TSS)	E-10151	SM2540D	4.0

[3] OWQ's Watershed Assessment and Planning Branch chemists assign non-numeric identifiers for parameters that do not have a CAS number assigned by the Chemical Abstracts Service of the American Chemical Society. These identifiers are in most cases derived from the U.S. EPA Identification Number (U.S. EPA substance Registry Services) or from the legacy U.S. EPA STORET number listed in the test method.

[4] "Methods for Chemical Analysis of Water and Wastes," March 1983, EPA-600 4-79-020. "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, November 1986, updates and amendments. "Standard Methods for the Examination of Water and Wastewater," 23rd Edition, 2017, updates and amendments.

[5] CRQLs listed are the higher values of laboratory reported MDL or method MDL times a factor of 3.18 as recommended in U.S. EPA wastewater compliance guidance. Typically, the resulting values are rounded to number nearest to (1, 2, or 5) x 10n, where n is an integer. CRQLs are equivalent to PQLs, MLs, RLs, or Method Reporting Limits (MRLs) in various methods and EPA guidance documentation.

General Chemistries	CAS Number or OWQ Identifier[3]	Method[4]	IDEM CRQL (mg/L) [5]
Solids, Total (TS)	E-10151	SM2540B	1.0
Sulfate	14808-79-8	EPA 375.2	0.5
Calcium	7440-70-2	SM 3500-Ca D	2.0
Magnesium	7439-95-4	EPA 200.7	95

Nutrients:	CAS Number or OWQ Identifier	Method	IDEM CRQL (mg/L)
TBOD5	E-10106T5	SM5210B	2.0
COD	E-10117	SM5220D	3.0
Nitrogen, Ammonia	7664-41-7	EPA 350.1	0.01
Nitrogen, Nitrate+Nitrite	E-10128	SM4500NO3-H	0.01
Phosphorus, Total	7723-14-0	EPA 365.1	0.01
Phosphorus, Ortho	14265-44-2	EPA 365.1	0.01
TKN	E-10264	EPA 351.2	0.1
DOC	E-DOC	EPA 415.3	0.5
TOC	E-10195	EPA 415.3	0.5

Total and/or Dissolved Metals:	CAS Number or OWQ Identifier	Method	IDEM CRQL (µg/L)
Aluminum	7429-90-5	EPA 200.7	20.0
Arsenic	7440-38-2	EPA 200.8	2.0
Barium	7440-39-3	EPA 200.8	2.0
Boron	7440-42-8	EPA 200.7	20
Cadmium	7440-43-9	EPA 200.8	1.0
Chromium, Total (VI + III)	7440-47-3	EPA 200.8	3.0
Copper	7440-50-8	EPA 200.8	2.0
Iron	7439-89-6	EPA 200.7	20
Lead	7439-92-1	EPA 200.8	2.0
Manganese	7439-96-5	EPA 200.8	0.5
Nickel	7439-92-1	EPA 200.8	1.5
Potassium	7440-09-7	EPA 200.7	100
Selenium	7440-02-0	EPA 200.8	4.0
Silica (Reactive)	7631-86-9	SM4500-Si D	6,000
Silver	7782-49-2	EPA 200.8	0.3
Sodium	7440-23-5	EPA 200.7	100
Strontium	7440-24-6	EPA 200.7	2.0
Zinc	7440-66-6	EPA 200.7	6.0

Bacteriology:	CAS Number or OWQ Identifier	Method	IDEM CRQL (MPN/100mL)
E. coli	ECOLI	SM9223B	1.0

(i)

Pesticide and SVOC Parameters from EPA Method 525.3	CAS Number or OWQ Identifier	IDEM CRQL (µg/L)
4,4'-DDT	50-29-3	0.1
Acetochlor	34256-82-1	0.1
Alachlor	15972-60-8	0.1
Aldrin	309-00-2	0.1
Atrazine (Aatrex)	1912-24-9	0.1
Chlordane, Alpha-	5103-71-9	0.1
Chlordane, Gamma-	5103-74-2	0.1
Chlorpyrifos	2921-88-2	0.1
Clomazone	81777-89-1	0.1
Cyanazine (Bladex)	21725-46-2	0.1
Desethylatrazine	6190-65-4	1.0
Desisopropylatrazine	1007-28-9	1.0
Di(2-ethylhexyl) adipate	103-23-1	1.0
Dieldrin	60-57-1	0.1
Endrin	72-20-8	0.1
Heptachlor	76-44-8	0.1
Heptachlor Epoxide	1024-57-3	0.1
Lindane	58-89-9	0.1
Methoxychlor	72-43-5	0.1
Metolachlor	51218-45-2	0.1
Nonachlor, cis-	5103-73-1	0.1
Oxychlordane	27304-13-8	0.1
Pendimethalin	40487-42-1	0.1
Pentachlorophenol	87-86-5	0.1
Propachlor	1918-16-7	0.1
Simazine	122-34-9	0.1
trans-Nonachlor	39765-80-5	0.1
Benzo[a]pyrene	50-32-8	0.1
DEHP	117-81-7	1.0
Hexachlorobenzene	118-74-1	0.1
Hexachlorocyclopentadiene	77-47-4	0.1
Trifluralin	1582-09-8	0.1

B.4.2. Probabilistic Monitoring Program Parameters:

Target compounds and parameters for specific sites are detailed in the sampling and analysis workplan for a Probabilistic Monitoring Project. The parameters are chosen from the following tables. Alternate and equivalent test methods which meet or exceed the IDEM CRQLs may be used by the contractor laboratory with IDEM approval.

General Chemistries	CAS NUMBER OR OWQ IDENTIFIER	Method	IDEM CRQL (mg/L)
Alkalinity (as $CaCO_3$)	E-14506	SM2320B	20.0
Chloride	16887-00-6	EPA 300.0	0.06
Cyanide (Total)	57-12-5	SM 4500-CN-E	0.010
Cyanide (Weak Acid Dissociable)	57-12-5	SM4500CN-I	0.010
Hardness (as $CaCO_3$)	E-11778	SM2340B	0.4
Solids, Dissolved Total (TDS)	E-10173	SM2540C	10.0
Solids, Suspended Total, (TSS)	E-10151	SM2540D	4.0
Solids, Total (TS)	E-10151	SM2540B	1.0
Sulfate	14808-79-8	EPA 300.0	0.05
Calcium	7440-70-2	EPA 200.7	0.020
Magnesium	7439-95-4	EPA 200.7	0.095

Nutrients:	CAS NUMBER OR OWQ IDENTIFIER	Method	IDEM CRQL (mg/L)
COD	E-10117	EPA 410.4	3.0
Nitrogen, Ammonia	7664-41-7	EPA 350.1	0.01
Nitrogen, Nitrate+Nitrite	E-10128	EPA 353.2	0.05
Phosphorus, Total	7723-14-0	EPA 365.1	0.01
TKN	E-10264	EPA 351.2	0.10
TOC	E-10195	SM5310C	1.0
DOC	E-DOC	SM5310C	1.0

Total and Dissolved Metals:	CAS NUMBER OR OWQ IDENTIFIER	Method	IDEM CRQL (µg/L)
Aluminum	7429-90-5	EPA 200.8	10.0
Antimony	7440-36-0	EPA 200.8	1.0
Arsenic	7440-38-2	EPA 200.8	2.0
Cadmium	7440-43-9	EPA 200.8	1.0
Chromium, Total (VI + III)	7440-47-3	EPA 200.8	3.0
Copper	7440-50-8	EPA 200.8	2.0
Lead	7439-92-1	EPA 200.8	2.0
Nickel	7439-92-1	EPA 200.8	1.5
Selenium	7440-02-0	EPA 200.8	4.0
Silver	7782-49-2	EPA 200.8	0.3
Zinc	7440-66-6	EPA 200.8	5.0

Bacteriology:	CAS NUMBER OR OWQ IDENTIFIER	Method	IDEM CRQL (MPN/100mL)
E. coli	ECOLI	SM 9223B or SM9223B(Colilert-18)	1.0
Total *Coliforms*	TCOLI	SM 9223B or SM9223B(Colilert-18)	1.0

B.4.3. Fish Tissues and Sediments Contaminants Monitoring Program

Parameters are grouped into tasks as detailed in the current RFP for the laboratory analyses of fish tissues and sediments (RFP 21-66919). A specific sampling and analysis workplan will choose specific tasks from the contract awarded from the RFP. The Task Lists are as follows:

Task 1 General parameters for tissue percent moisture and percent lipid
Task 2 Generals parameters for sediments - percent solids, Total Volatile Solids (TVS), Total Organic Carbon (TOC), Ammonia as N, Acid Volatile Sulfides(AVS), Grain size and specific gravity.
Task 2B Nutrient parameters – Total Kjeldahl Nitrogen (TKN), nitrite plus nitrate (NO_2+NO_3), ortho-(reactive) phosphate, acid-hydrolyzable phosphorus, organic phosphorus, total phosphorus, loss on ignition.
Task 3 Total Polychlorinated biphenyls (PCB) (tissues only).
Task 3B PCB congeners.
Task 3C Polychlorinated Dioxins and Furans.
Task 4 Aroclors of PCBs (sediments only).
Task 5 Organochlorine pesticides.
Task 6 Cd, Pb, Hg, Se.
Task 6A Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn.
Task 6B Long list of metals.
Task 6C Cyanide (sediments only).
Task 6D AVS and simultaneously extracted metals (SEM) (sediments only).
Task 6E Tributyltin
Task 6F Total and Methyl-Mercury by Methods 1631 and 1630 respectively
Task 7 Acid extractable semi-volatile organic compounds.
Task 8 Base/neutral extractable semi-volatile organic compounds.
Task 9 Volatile organic compounds.
Task 10 Polynuclear aromatic hydrocarbons.
Task 11 Polybrominated diphenyl Ether (PBDE).
Task 12 Perfluorinated Compounds (PFCs).

Table B.4.1.3.1: Fish Tissue General Parameters

TASK 1
PERCENT LIPID and PERCENT MOISTURE

PARAMETER	BIOTA CRQL	UNITS
PERCENT LIPID	0.1	%
PERCENT MOISTURE	0.1	%

%=percentage units

TASK 2
GENERAL CHEMISTRY
TARGET PARAMETER LIST (TPL)

PARAMETER	CAS NUMBER or OWQ Identifier	BIOLOGICAL		SEDIMENT	
		CRQL	UNITS*	CRQL	UNITS**
Percent Solids		NA	NA	1.0	%
Total Volatile Solids	E-11927	NA	NA	0.1	%
Total Organic Carbon[2]	E-10195	NA	NA	0.1	%
Total Ammonia as N	7664-41-7	NA	NA	11.0	mg/kg
Acid Volatile Sulfide	E-AVS	NA	NA	19.0	mg/kg
Grain Size Analysis	GRAINSIZE	NA	NA	1.0	%[@]
Specific Gravity	SPECGRAVITY	NA	NA	0.1	g/cm^3 [@@]

NA Not Applicable.
@ A measure of the frequency distribution of the size ranges of particles.
@@ Ratio of the mass of a given volume of sediment material at a specific temperature to an equal volume of distilled water at the same stated temperature.
** dry weight basis.
2 based on high-temperature combustion after acid treatment (Plumb 1981)
% percentage units
mg/kg milligrams per kilogram

TASK 2B
GENERAL CHEMISTRY
TARGET PARAMETER LIST (TPL)

PARAMETER	CAS NUMBER OR OWQ IDENTIFIER	BIOLOGICAL		SEDIMENT	
		CRQL	UNITS*	CRQL	UNITS**
Nitrite + Nitrate	E-10128	NA	NA	0.13	mg/kg
Total Kjeldahl Nitrogen	E-10264	NA	NA	6.3	mg/kg
Extractable* Nitrogen		NA	NA		mg/kg
Total Phosphorus	7723-14-0	NA	NA	3.2	mg/kg
Ortho (reactive) Phosphorus	14265-44-2	NA	NA		mg/kg
Acid Hydrolyzable Phosphorus		NA	NA		mg/kg
Organic Phosphorus	E17148453	NA	NA		mg/kg
Chemical Oxygen Demand	E-10117	NA	NA	5.0	mg/kg

NA Not Applicable.
* Biologically available.
** dry weight basis.
mg/kg milligrams per kilogram

Table B.4.1.3.2: Fish Tissue Chemistry Total PCBs.

TASK 3
POLYCHLORINATED BIPHENYLS (PCB)
TARGET PARAMETER LIST (TPL)
Preparation Method 3540C (U.S. EPA 1996)
Method 8082A (U.S. EPA 2007c)

PARAMETER	CAS NUMBER	BIOLOGICAL CRQL	BIOLOGICAL UNITS*	SEDIMENT CRQL	SEDIMENT UNITS**
Total PCBs	1336-36-3	20.0	µg/kg	NA	NA
Aroclor 1016	12674-11-2	50.0	µg/kg	NA	NA
Aroclor 1210	147601-87-4	50.0	µg/kg	NA	NA
Aroclor 1216	151820-27-8	50.0	µg/kg	NA	NA
Aroclor 1221	11104-28-2	50.0	µg/kg	NA	NA
Aroclor 1231	37234-40-5	50.0	µg/kg	NA	NA
Aroclor 1232	11141-16-5	50.0	µg/kg	NA	NA
Aroclor 1240	71328-89-7	50.0	µg/kg	NA	NA
Aroclor 1242	53469-21-9	50.0	µg/kg	NA	NA
Aroclor 1248	12672-29-6	50.0	µg/kg	NA	NA
Aroclor 1250	165245-51-2	50.0	µg/kg	NA	NA
Aroclor 1252	89577-78-6	50.0	µg/kg	NA	NA
Aroclor 1254	11097-69-1	50.0	µg/kg	NA	NA
Aroclor 1260	11096-82-5	50.0	µg/kg	NA	NA
Aroclor 1262	37324-23-5	50.0	µg/kg	NA	NA
Aroclor 1268	11100-14-4	50.0	µg/kg	NA	NA
Aroclor (unspecified)	12767-79-2	50.0	µg/kg	NA	NA

µg/kg (ww)=micrograms per kilogram wet weight basis

Table B.4.1.3.3: Fish Tissue Chemistry PCB Congener Compounds.

TASK 3B
POLYCHLORINATED BIPHENYL CONGENERS S (PCB)
TISSUES BY CAPILLARY CHROMATOGRAPHY
TARGET PARAMETER LIST (TPL)

Method 1668 Rev. B (U.S. EPA 2008a)

PARAMETER	CAS NUMBER	BIOLOGICAL CRQL	BIOLOGICAL UNITS*	SEDIMENT CRQL	SEDIMENT UNITS**
PCB congeners	See Table Below	0.5 - 20	ng/kg	0.5 - 20	ng/kg

* wet weight basis ng/kg nanograms per kilogram
** dry weight basis

Table of PCB Congeners and Other Species				
Descriptor	**CAS NUMBER OR OWQ IDENTIFIER**	**Current BZ[6] & IUPAC Number**	**IUPAC Name**	**Type**
CP1_---_--_--	2051-60-7	1	2-Chlorobiphenyl	Congener
CP0_---_--_--	2051-61-8	2	3-Chlorobiphenyl	Congener
CP0_---_--_--	2051-62-9	3	4-Chlorobiphenyl	Congener
---_---_--_--	13029-08-8	4	2,2'-Dichlorobiphenyl	Congener
CP1_---_--_--	16605-91-7	5	2,3-Dichlorobiphenyl	Congener
CP1_---_--_--	25569-80-6	6	2,3'-Dichlorobiphenyl	Congener

Table B.4.1.3.3 Task 3B continued				
Descriptor	**CAS NUMBER OR OWQ IDENTIFIER**	**Current BZ & IUPAC Number**	**IUPAC Name**	**Type**
CP1_---_--_--	33284-50-3	7	2,4-Dichlorobiphenyl	Congener
CP1_---_--_--	34883-43-7	8	2,4'-Dichlorobiphenyl	Congener
CP1_---_--_--	34883-39-1	9	2,5-Dichlorobiphenyl	Congener
---_---_--_--	33146-45-1	10	2,6-Dichlorobiphenyl	Congener
CP0_---_--_2M	2050-67-1	11	3,3'-Dichlorobiphenyl	Congener
CP0_---_--_--	2974-92-7	12	3,4-Dichlorobiphenyl	Congener
CP0_---_--_--	2974-90-5	13	3,4'-Dichlorobiphenyl	Congener
CP0_---_--_2M	34883-41-5	14	3,5-Dichlorobiphenyl	Congener
CP0_---_PP_--	2050-68-2	15	4,4'-Dichlorobiphenyl	Congener
---_---_--_--	38444-78-9	16	2,2',3-Trichlorobiphenyl	Congener
---_---_--_--	37680-66-3	17	2,2',4-Trichlorobiphenyl	Congener
---_---_--_--	37680-65-2	18	2,2',5-Trichlorobiphenyl	Congener
---_---_--_--	38444-73-4	19	2,2',6-Trichlorobiphenyl	Congener
CP1_---_--_2M	38444-84-7	20	2,3,3'-Trichlorobiphenyl	Congener
CP1_---_--_--	55702-46-0	21	2,3,4-Trichlorobiphenyl	Congener
CP1_---_--_--	38444-85-8	22	2,3,4'-Trichlorobiphenyl	Congener
CP1_---_--_2M	55720-44-0	23	2,3,5-Trichlorobiphenyl	Congener
---_---_--_--	55702-45-9	24	2,3,6-Trichlorobiphenyl	Congener
CP1_---_--_--	55712-37-3	25	2,3',4-Trichlorobiphenyl	Congener
CP1_---_--_2M	38444-81-4	26	2,3',5-Trichlorobiphenyl	Congener
---_---_--_--	38444-76-7	27	2,3',6-Trichlorobiphenyl	Congener
CP1_---_PP_--	7012-37-5	28	2,4,4'-Trichlorobiphenyl	Congener
CP1_---_--_--	15862-07-4	29	2,4,5-Trichlorobiphenyl	Congener
---_---_--_--	35693-92-6	30	2,4,6-Trichlorobiphenyl	Congener
CP1_---_--_--	16606-02-3	31	2,4',5-Trichlorobiphenyl	Congener
---_---_--_--	38444-77-8	32	2,4',6-Trichlorobiphenyl	Congener
CP1_---_--_--	38444-86-9	33	2,3',4'-Trichlorobiphenyl	Congener

6 BZ was named after Ballschmiter, K.; Zell, M. (1980). "Analysis of polychlorinated biphenyls (PCB) by glass capillary gas chromatography". *Fresenius' Zeitschrift für Analytische Chemie* **302**: 20–31.

Table B.4.1.3.3 Task 3B continued				
Descriptor	**CAS NUMBER OR OWQ IDENTIFIER**	**Current BZ & IUPAC Number**	**IUPAC Name**	**Type**
CP1_---_--_2M	37680-68-5	34	2,3',5'-Trichlorobiphenyl	Congener
CP0_---_--_2M	37680-69-6	35	3,3',4-Trichlorobiphenyl	Congener
CP0_---_--_2M	38444-87-0	36	3,3',5-Trichlorobiphenyl	Congener
CP0_---_PP_--	38444-90-5	37	3,4,4'-Trichlorobiphenyl	Congener
CP0_---_--_2M	53555-66-1	38	3,4,5-Trichlorobiphenyl	Congener
CP0_---_--_2M	38444-88-1	39	3,4',5-Trichlorobiphenyl	Congener
---_4CL_--_2M	38444-93-8	40	2,2',3,3'-Tetrachlorobiphenyl	Congener
---_4CL_--_--	52663-59-9	41	2,2',3,4-Tetrachlorobiphenyl	Congener
---_4CL_--_--	36559-22-5	42	2,2',3,4'-Tetrachlorobiphenyl	Congener
---_4CL_--_2M	70362-46-8	43	2,2',3,5-Tetrachlorobiphenyl	Congener
---_4CL_--_2M	41464-39-5	44	2,2',3,5'-Tetrachlorobiphenyl	Congener
---_4CL_--_--	70362-45-7	45	2,2',3,6-Tetrachlorobiphenyl	Congener
---_4CL_--_--	41464-47-5	46	2,2',3,6'-Tetrachlorobiphenyl	Congener
---_4CL_PP_--	2437-79-8	47	2,2',4,4'-Tetrachlorobiphenyl	Congener
---_4CL_--_--	70362-47-9	48	2,2',4,5-Tetrachlorobiphenyl	Congener
---_4CL_--_--	41464-40-8	49	2,2',4,5'-Tetrachlorobiphenyl	Congener
---_4CL_--_--	62796-65-0	50	2,2',4,6-Tetrachlorobiphenyl	Congener
---_4CL_--_--	68194-04-7	51	2,2',4,6'-Tetrachlorobiphenyl	Congener
---_4CL_--_2M	35693-99-3	52	2,2',5,5'-Tetrachlorobiphenyl	Congener
---_4CL_--_--	41464-41-9	53	2,2',5,6'-Tetrachlorobiphenyl	Congener
---_4CL_--_--	15968-05-5	54	2,2',6,6'-Tetrachlorobiphenyl	Congener
CP1_4CL_--_2M	74338-24-2	55	2,3,3',4-Tetrachlorobiphenyl	Congener
CP1_4CL_--_2M	41464-43-1	56	2,3,3',4'-Tetrachlorobiphenyl	Congener
CP1_4CL_--_2M	70424-67-8	57	2,3,3',5-Tetrachlorobiphenyl	Congener
CP1_4CL_--_2M	41464-49-7	58	2,3,3',5'-Tetrachlorobiphenyl	Congener
---_4CL_--_2M	74472-33-6	59	2,3,3',6-Tetrachlorobiphenyl	Congener
CP1_4CL_PP_--	33025-41-1	60	2,3,4,4'-Tetrachlorobiphenyl	Congener
CP1_4CL_--_2M	33284-53-6	61	2,3,4,5-Tetrachlorobiphenyl	Congener
---_4CL_--_--	54230-22-7	62	2,3,4,6-Tetrachlorobiphenyl	Congener
CP1_4CL_--_2M	74472-34-7	63	2,3,4',5-Tetrachlorobiphenyl	Congener
---_4CL_--_--	52663-58-8	64	2,3,4',6-Tetrachlorobiphenyl	Congener
---_4CL_--_2M	33284-54-7	65	2,3,5,6-Tetrachlorobiphenyl	Congener
CP1_4CL_PP_--	32598-10-0	66	2,3',4,4'-Tetrachlorobiphenyl	Congener
CP1_4CL_--_2M	73575-53-8	67	2,3',4,5-Tetrachlorobiphenyl	Congener
CP1_4CL_--_2M	73575-52-7	68	2,3',4,5'-Tetrachlorobiphenyl	Congener
---_4CL_--_--	60233-24-1	69	2,3',4,6-Tetrachlorobiphenyl	Congener
CP1_4CL_--_2M	32598-11-1	70	2,3',4',5-Tetrachlorobiphenyl	Congener
---_4CL_--_--	41464-46-4	71	2,3,4,6-Tetrachlorobiphenyl	Congener
CP1_4CL_--_2M	41464-42-0	72	2,3,5,5-Tetrachlorobiphenyl	Congener
---_4CL_--_2M	74338-23-1	73	2,3,5,6-Tetrachlorobiphenyl	Congener
CP1_4CL_PP_--	32690-93-0	74	2,4,4,5-Tetrachlorobiphenyl	Congener
---_4CL_PP_--	32598-12-2	75	2,4,4,6-Tetrachlorobiphenyl	Congener

Table B.4.1.3.3 Task 3B continued				
Descriptor	**CAS NUMBER OR OWQ IDENTIFIER**	**Current BZ & IUPAC Number**	**IUPAC Name**	**Type**
CP1_4CL_--_2M	70362-48-0	76	2,3,4,5-Tetrachlorobiphenyl	Congener
CP0_4CL_PP_2M	32598-13-3	77	3,3,4,4-Tetrachlorobiphenyl	Congener
CP0_4CL_--_2M	70362-49-1	78	3,3,4,5-Tetrachlorobiphenyl	Congener
CP0_4CL_--_2M	41464-48-6	79	3,3,4,5-Tetrachlorobiphenyl	Congener
CP0_4CL_--_2M	33284-52-5	80	3,3,5,5-Tetrachlorobiphenyl	Congener
CP0_4CL_PP_2M	70362-50-4	81	3,4,4,5-Tetrachlorobiphenyl	Congener
---_4CL_--_2M	52663-62-4	82	2,2,3,3,4-Pentachlorobiphenyl	Congener
---_4CL_--_2M	60145-20-2	83	2,2,3,3,5-Pentachlorobiphenyl	Congener
---_4CL_--_2M	52663-60-2	84	2,2,3,3,6-Pentachlorobiphenyl	Congener
---_4CL_PP_--	65510-45-4	85	2,2,3,4,4-Pentachlorobiphenyl	Congener
---_4CL_--_2M	55312-69-1	86	2,2,3,4,5-Pentachlorobiphenyl	Congener
---_4CL_--_2M	38380-02-8	87	2,2,3,4,5-Pentachlorobiphenyl	Congener
---_4CL_--_--	55215-17-3	88	2,2,3,4,6-Pentachlorobiphenyl	Congener
---_4CL_--_--	73575-57-2	89	2,2,3,4,6-Pentachlorobiphenyl	Congener
---_4CL_--_2M	68194-07-0	90	2,2,3,4,5-Pentachlorobiphenyl	Congener
---_4CL_--_--	68194-05-8	91	2,2’,3,4’,6-Pentachlorobiphenyl	Congener
---_4CL_--_2M	52663-61-3	92	2,2’,3,5,5’-Pentachlorobiphenyl	Congener
---_4CL_--_2M	73575-56-1	93	2,2’,3,5,6-Pentachlorobiphenyl	Congener
---_4CL_--_2M	73575-55-0	94	2,2’,3,5,6’-Pentachlorobiphenyl	Congener
---_4CL_--_2M	38379-99-6	95	2,2’,3,5’,6-Pentachlorobiphenyl	Congener
---_4CL_--_--	73575-54-9	96	2,2’,3,6,6’-Pentachlorobiphenyl	Congener
---_4CL_--_2M	41464-51-1	97	2,2’,3,4’,5’-Pentachlorobiphenyl	Congener
---_4CL_--_--	60233-25-2	98	2,2’,3,4’,6’-Pentachlorobiphenyl	Congener
---_4CL_PP_--	38380-01-7	99	2,2’,4,4’,5-Pentachlorobiphenyl	Congener
---_4CL_PP_--	39485-83-1	100	2,2’,4,4’,6-Pentachlorobiphenyl	Congener
---_4CL_--_2M	37680-73-2	101	2,2’,4,5,5’-Pentachlorobiphenyl	Congener
---_4CL_--_--	68194-06-9	102	2,2’,4,5,6’-Pentachlorobiphenyl	Congener
---_4CL_--_--	60145-21-3	103	2,2’,4,5’,6-Pentachlorobiphenyl	Congener
---_4CL_--_--	56558-16-8	104	2,2’,4,6,6’-Pentachlorobiphenyl	Congener
CP1_4CL_PP_2M	32598-14-4	105	2,3,3’,4,4’-Pentachlorobiphenyl	Congener
CP1_4CL_--_2M	70424-69-0	106	2,3,3’,4,5-Pentachlorobiphenyl	Congener
CP1_4CL_--_2M	70424-68-9	107	2,3,3’,4’,5-Pentachlorobiphenyl	Congener
CP1_4CL_--_2M	70362-41-3	108	2,3,3’,4,5’-Pentachlorobiphenyl	Congener
---_4CL_--_2M	74472-35-8	109	2,3,3’,4,6-Pentachlorobiphenyl	Congener
---_4CL_--_2M	38380-03-9	110	2,3,3’,4’,6-Pentachlorobiphenyl	Congener
CP1_4CL_--_2M	39635-32-0	111	2,3,3’,5,5’-Pentachlorobiphenyl	Congener
---_4CL_--_2M	74472-36-9	112	2,3,3’,5,6-Pentachlorobiphenyl	Congener
---_4CL_--_2M	68194-10-5	113	2,3,3’,5’,6-Pentachlorobiphenyl	Congener
CP1_4CL_PP_2M	74472-37-0	114	2,3,4,4’,5-Pentachlorobiphenyl	Congener
---_4CL_PP_--	74472-38-1	115	2,3,4,4’,6-Pentachlorobiphenyl	Congener
---_4CL_--_2M	18259-05-7	116	2,3,4,5,6-Pentachlorobiphenyl	Congener
---_4CL_--_2M	68194-11-6	117	2,3,4',5,6-Pentachlorobiphenyl	Congener

Table B.4.1.3.3 Task 3B continued				
Descriptor	**CAS NUMBER OR OWQ IDENTIFIER**	**Current BZ & IUPAC Number**	**IUPAC Name**	**Type**
CP1_4CL_PP_2M	31508-00-6	118	2,3',4,4',5-Pentachlorobiphenyl	Congener
---_4CL_PP_--	56558-17-9	119	2,3',4,4',6-Pentachlorobiphenyl	Congener
CP1_4CL_--_2M	68194-12-7	120	2,3',4,5,5'-Pentachlorobiphenyl	Congener
---_4CL_--_2M	56558-18-0	121	2,3',4,5',6-Pentachlorobiphenyl	Congener
CP1_4CL_--_2M	76842-07-4	122	2,3,3',4',5'-Pentachlorobiphenyl	Congener
CP1_4CL_PP_2M	65510-44-3	123	2,3',4,4',5'-Pentachlorobiphenyl	Congener
CP1_4CL_--_2M	70424-70-3	124	2,3',4',5,5'-Pentachlorobiphenyl	Congener
---_4CL_--_2M	74472-39-2	125	2,3',4',5',6-Pentachlorobiphenyl	Congener
CP0_4CL_PP_2M	57465-28-8	126	3,3',4,4',5-Pentachlorobiphenyl	Congener
CP0_4CL_--_2M	39635-33-1	127	3,3',4,5,5'-Pentachlorobiphenyl	Congener
---_4CL_PP_2M	38380-07-3	128	2,2',3,3',4,4'-Hexachlorobiphenyl	Congener
---_4CL_--_2M	55215-18-4	129	2,2',3,3',4,5-Hexachlorobiphenyl	Congener
---_4CL_--_2M	52663-66-8	130	2,2',3,3',4,5'-Hexachlorobiphenyl	Congener
---_4CL_--_2M	61798-70-7	131	2,2',3,3',4,6-Hexachlorobiphenyl	Congener
---_4CL_--_2M	38380-05-1	132	2,2',3,3',4,6'-Hexachlorobiphenyl	Congener
---_4CL_--_2M	35694-04-3	133	2,2',3,3',5,5'-Hexachlorobiphenyl	Congener
---_4CL_--_2M	52704-70-8	134	2,2',3,3',5,6-Hexachlorobiphenyl	Congener
---_4CL_--_2M	52744-13-5	135	2,2',3,3',5,6'-Hexachlorobiphenyl	Congener
---_4CL_--_2M	38411-22-2	136	2,2',3,3',6,6'-Hexachlorobiphenyl	Congener
---_4CL_PP_2M	35694-06-5	137	2,2',3,4,4',5-Hexachlorobiphenyl	Congener
---_4CL_PP_2M	35065-28-2	138	2,2',3,4,4',5'-Hexachlorobiphenyl	Congener
---_4CL_PP_--	56030-56-9	139	2,2',3,4,4',6-Hexachlorobiphenyl	Congener
---_4CL_PP_--	59291-64-4	140	2,2',3,4,4',6'-Hexachlorobiphenyl	Congener
---_4CL_--_2M	52712-04-6	141	2,2',3,4,5,5'-Hexachlorobiphenyl	Congener
---_4CL_--_2M	41411-61-4	142	2,2',3,4,5,6-Hexachlorobiphenyl	Congener
---_4CL_--_2M	68194-15-0	143	2,2',3,4,5,6'-Hexachlorobiphenyl	Congener
---_4CL_--_2M	68194-14-9	144	2,2',3,4,5',6-Hexachlorobiphenyl	Congener
---_4CL_--_--	74472-40-5	145	2,2',3,4,6,6'-Hexachlorobiphenyl	Congener
---_4CL_--_2M	51908-16-8	146	2,2',3,4',5,5'-Hexachlorobiphenyl	Congener
---_4CL_--_2M	68194-13-8	147	2,2',3,4',5,6-Hexachlorobiphenyl	Congener
---_4CL_--_2M	74472-41-6	148	2,2',3,4',5,6'-Hexachlorobiphenyl	Congener
---_4CL_--_2M	38380-04-0	149	2,2',3,4',5',6-Hexachlorobiphenyl	Congener
---_4CL_--_--	68194-08-1	150	2,2',3,4',6,6'-Hexachlorobiphenyl	Congener
---_4CL_--_2M	52663-63-5	151	2,2',3,5,5',6-Hexachlorobiphenyl	Congener
---_4CL_--_2M	68194-09-2	152	2,2',3,5,6,6'-Hexachlorobiphenyl	Congener
---_4CL_PP_2M	35065-27-1	153	2,2',4,4',5,5'-Hexachlorobiphenyl	Congener
---_4CL_PP_--	60145-22-4	154	2,2',4,4',5,6'-Hexachlorobiphenyl	Congener
---_4CL_PP_--	33979-03-2	155	2,2',4,4',6,6'-Hexachlorobiphenyl	Congener
CP1_4CL_PP_2M	38380-08-4	156	2,3,3',4,4',5-Hexachlorobiphenyl	Congener
CP1_4CL_PP_2M	69782-90-7	157	2,3,3',4,4',5'-Hexachlorobiphenyl	Congener
---_4CL_PP_2M	74472-42-7	158	2,3,3',4,4',6-Hexachlorobiphenyl	Congener
CP1_4CL_--_2M	39635-35-3	159	2,3,3',4,5,5'-Hexachlorobiphenyl	Congener

Table B.4.1.3.3 Task 3B continued				
Descriptor	**CAS NUMBER OR OWQ IDENTIFIER**	**Current BZ & IUPAC Number**	**IUPAC Name**	**Type**
---_4CL_--_2M	41411-62-5	160	2,3,3',4,5,6-Hexachlorobiphenyl	Congener
---_4CL_--_2M	74472-43-8	161	2,3,3',4,5',6-Hexachlorobiphenyl	Congener
CP1_4CL_--_2M	39635-34-2	162	2,3,3',4',5,5'-Hexachlorobiphenyl	Congener
---_4CL_--_2M	74472-44-9	163	2,3,3',4',5,6-Hexachlorobiphenyl	Congener
---_4CL_--_2M	74472-45-0	164	2,3,3',4',5',6-Hexachlorobiphenyl	Congener
---_4CL_--_2M	74472-46-1	165	2,3,3',5,5',6-Hexachlorobiphenyl	Congener
---_4CL_PP_2M	41411-63-6	166	2,3,4,4',5,6-Hexachlorobiphenyl	Congener
CP1_4CL_PP_2M	52663-72-6	167	2,3',4,4',5,5'-Hexachlorobiphenyl	Congener
---_4CL_PP_2M	59291-65-5	168	2,3',4,4',5',6-Hexachlorobiphenyl	Congener
CP0_4CL_PP_2M	32774-16-6	169	3,3',4,4',5,5'-Hexachlorobiphenyl	Congener
---_4CL_PP_2M	35065-30-6	170	2,2',3,3',4,4',5-Heptachlorobiphenyl	Congener
---_4CL_PP_2M	52663-71-5	171	2,2',3,3',4,4',6-Heptachlorobiphenyl	Congener
---_4CL_--_2M	52663-74-8	172	2,2',3,3',4,5,5'-Heptachlorobiphenyl	Congener
---_4CL_--_2M	68194-16-1	173	2,2',3,3',4,5,6-Heptachlorobiphenyl	Congener
---_4CL_--_2M	38411-25-5	174	2,2',3,3',4,5,6'-Heptachlorobiphenyl	Congener
---_4CL_--_2M	40186-70-7	175	2,2',3,3',4,5',6-Heptachlorobiphenyl	Congener
---_4CL_--_2M	52663-65-7	176	2,2',3,3',4,6,6'-Heptachlorobiphenyl	Congener
---_4CL_--_2M	52663-70-4	177	2,2',3,3',4,5',6'-Heptachlorobiphenyl	Congener
---_4CL_--_2M	52663-67-9	178	2,2',3,3',5,5',6-Heptachlorobiphenyl	Congener
---_4CL_--_2M	52663-64-6	179	2,2',3,3',5,6,6'-Heptachlorobiphenyl	Congener
---_4CL_PP_2M	35065-29-3	180	2,2',3,4,4',5,5'-Heptachlorobiphenyl	Congener
---_4CL_PP_2M	74472-47-2	181	2,2',3,4,4',5,6-Heptachlorobiphenyl	Congener
---_4CL_PP_2M	60145-23-5	182	2,2',3,4,4',5,6'-Heptachlorobiphenyl	Congener
---_4CL_PP_2M	52663-69-1	183	2,2',3,4,4',5',6-Heptachlorobiphenyl	Congener
---_4CL_PP_--	74472-48-3	184	2,2',3,4,4',6,6'-Heptachlorobiphenyl	Congener
---_4CL_--_2M	52712-05-7	185	2,2',3,4,5,5',6-Heptachlorobiphenyl	Congener
---_4CL_--_2M	74472-49-4	186	2,2',3,4,5,6,6'-Heptachlorobiphenyl	Congener
---_4CL_--_2M	52663-68-0	187	2,2',3,4',5,5',6-Heptachlorobiphenyl	Congener
---_4CL_--_2M	74487-85-7	188	2,2',3,4',5,6,6'-Heptachlorobiphenyl	Congener
CP1_4CL_PP_2M	39635-31-9	189	2,3,3',4,4',5,5'-Heptachlorobiphenyl	Congener
---_4CL_PP_2M	41411-64-7	190	2,3,3',4,4',5,6-Heptachlorobiphenyl	Congener
---_4CL_PP_2M	74472-50-7	191	2,3,3',4,4',5',6-Heptachlorobiphenyl	Congener
---_4CL_--_2M	74472-51-8	192	2,3,3',4,5,5',6-Heptachlorobiphenyl	Congener
---_4CL_--_2M	69782-91-8	193	2,3,3',4',5,5',6-Heptachlorobiphenyl	Congener
---_4CL_PP_2M	35694-08-7	194	2,2',3,3',4,4',5,5'-Octachlorobiphenyl	Congener
---_4CL_PP_2M	52663-78-2	195	2,2',3,3',4,4',5,6-Octachlorobiphenyl	Congener
---_4CL_PP_2M	42740-50-1	196	2,2',3,3',4,4',5,6'-Octachlorobiphenyl	Congener
---_4CL_PP_2M	33091-17-7	197	2,2',3,3',4,4',6,6'-Octachlorobiphenyl	Congener
---_4CL_--_2M	68194-17-2	198	2,2',3,3',4,5,5',6-Octachlorobiphenyl	Congener
---_4CL_--_2M	52663-75-9	199	2,2',3,3',4,5,5',6'-Octachlorobiphenyl	Congener
---_4CL_--_2M	52663-73-7	200	2,2',3,3',4,5,6,6'-Octachlorobiphenyl	Congener
---_4CL_--_2M	40186-71-8	201	2,2',3,3',4,5',6,6'-Octachlorobiphenyl	Congener

Table B.4.1.3.3 Task 3B continued				
Descriptor	**CAS NUMBER OR OWQ IDENTIFIER**	**Current BZ & IUPAC Number**	**IUPAC Name**	**Type**
---_4CL_--_2M	2136-99-4	202	2,2',3,3',5,5',6,6'-Octachlorobiphenyl	Congener
---_4CL_PP_2M	52663-76-0	203	2,2',3,4,4',5,5',6-Octachlorobiphenyl	Congener
---_4CL_PP_2M	74472-52-9	204	2,2',3,4,4',5,6,6'-Octachlorobiphenyl	Congener
---_4CL_PP_2M	74472-53-0	205	2,3,3',4,4',5,5',6-Octachlorobiphenyl	Congener
---_4CL_PP_2M	40186-72-9	206	2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl	Congener
---_4CL_PP_2M	52663-79-3	207	2,2',3,3',4,4',5,6,6'-Nonachlorobiphenyl	Congener
---_4CL_--_2M	52663-77-1	208	2,2',3,3',4,5,5',6,6'-Nonachlorobiphenyl	Congener
---_---_--_--	2051-24-3	209	Decachlorobiphenyl	Congener
	27323-18-8		Monochlorobiphenyl	Homolog
	25512-42-9		Dichlorobiphenyl	Homolog
	25323-68-6		Trichlorobiphenyl	Homolog
	26914-33-0		Tetrachlorobiphenyl	Homolog
	25429-29-2		Pentachlorobiphenyl	Homolog
	26601-64-9		Hexachlorobiphenyl	Homolog
	28655-71-2		Heptachlorobiphenyl	Homolog
	55722-26-4		Octachlorobiphenyl	Homolog
	53742-07-7		Nonachlorobiphenyl	Homolog
	1336-36-3		Polychlorinated biphenyl (PCB)	Category

Table 4.1.3.4: Fish Tissue Chemistry Polychlorinated Dioxins and Furans.

TASK 3C
POLYCHLORINATED DIOXINS AND FURANS
TARGET PARAMETER LIST (TPL)

Method 1613 Rev. B (U.S. EPA 1994b)

		BIOLOGICAL		SEDIMENT	
PARAMETER	**CAS NUMBER**	**CRQL**	**UNITS***	**CRQL**	**UNITS****
2,3,7,8-TCDF	51207-31-9	1.0	ng/kg	1.0	ng/kg
2,3,7,8-TCDD (Dioxin)	1746-01-6	1.0	ng/kg	1.0	ng/kg
1,2,3,7,8-PeCDF	57117-41-6	2.5	ng/kg	2.5	ng/kg
2,3,4,7,8-PeCDF	57117-31-4	2.5	ng/kg	2.5	ng/kg
1,2,3,7,8-PeCDD	40321-76-4	2.5	ng/kg	2.5	ng/kg
1,2,3,4,7,8-HxCDF	70648-26-9	5.0	ng/kg	5.0	ng/kg
1,2,3,6,7,8-HxCDF	57117-44-9	5.0	ng/kg	5.0	ng/kg
2,3,4,6,7,8-HxCDF	60851-34-5	5.0	ng/kg	5.0	ng/kg
1,2,3,4,7,8-HxCDD	39227-28-6	5.0	ng/kg	5.0	ng/kg
1,2,3,6,7,8-HxCDD	57653-85-7	5.0	ng/kg	5.0	ng/kg
1,2,3,7,8,9-HxCDD	19408-74-3	5.0	ng/kg	5.0	ng/kg
1,2,3,7,8,9-HxCDF	72918-21-9	5.0	ng/kg	5.0	ng/kg
1,2,3,4,6,7,8-HpCDF	67562-39-4	5.0	ng/kg	5.0	ng/kg
1,2,3,4,6,7,8-HpCDD	35822-46-9	5.0	ng/kg	5.0	ng/kg
1,2,3,4,7,8,9-HpCDF	55673-89-7	5.0	ng/kg	5.0	ng/kg
OCDD	3268-87-9	5.0	ng/kg	5.0	ng/kg
OCDF	39001-02-0	5.0	ng/kg	5.0	ng/kg

* wet weight basis
** dry weight basis
TCDD = Tetrachlorodibenzo-dioxin
TCDF = Tetrachlorodibenzofuran
PeCDD = Pentachlorodibenzo-p-dioxin
PeCDF = Pentachlorodibenzofuran
HxCDD = Hexachlorodibenzo-p-dioxin
HxCDF = Hexachlorodibenzofuran
HpCDD = Heptachlorodibenzo-p-dioxin
HpCDF = Heptachlorodibenzofuran
OCDD = Octachlorodibenzo-p-dioxin
OCDF = Octachlorodibenzofuran
ng/kg (ww)=nanograms per kilogram wet weight basis

Table 4.1.3.5: Polychlorinated Biphenyls (PCB) Aroclors

TASK 4
TARGET PARAMETER LIST (TPL)

Method 8082A: (U.S. EPA 2007c)

PARAMETER	CAS NUMBER	BIOLOGICAL CRQL	BIOLOGICAL UNITS*	SEDIMENT CRQL	SEDIMENT UNITS**
Aroclor - 1016	12674-11-2	NA*	NA*	20.0	µg/kg
Aroclor - 1221	11104-28-2	NA*	NA*	20.0	µg/kg
Aroclor - 1232	11141-16-5	NA*	NA*	20.0	µg/kg
Aroclor - 1242	53469-21-9	NA*	NA*	20.0	µg/kg
Aroclor - 1248	12672-29-6	NA*	NA*	20.0	µg/kg
Aroclor - 1254	11097-69-1	NA*	NA*	20.0	µg/kg
Aroclor - 1260	11096-82-5	NA*	NA*	20.0	µg/kg
Aroclor - 1262	37324-23-5	NA*	NA*	20.0	µg/kg

NA Not Applicable.
* wet weight basis
** dry weight basis
µg/kg micrograms per kilogram

Table B.4.1.3.6: Fish Tissue Chemistry Organochlorine Pesticides

TASK 5
ORGANOCHLORINE PESTICIDES
TARGET PARAMETER LIST (TPL)

Method 8081B (U.S. EPA 2007b)

PARAMETER	CAS NUMBER	BIOLOGICAL CRQL	BIOLOGICAL UNITS*	SEDIMENT CRQL	SEDIMENT UNITS**
Aldrin	309-00-2	2.5	µg/kg	2.5	µg/kg
BHC, alpha-	319-84-6	2.5	µg/kg	2.5	µg/kg
BHC, beta-	319-85-7	2.5	µg/kg	2.5	µg/kg
BHC, delta-	319-86-8	2.5	µg/kg	2.5	µg/kg
BHC, gamma-	58-89-9	2.5	µg/kg	2.5	µg/kg
Chlordane, gamma(trans)	5103-74-2	2.5	µg/kg	2.5	µg/kg
Chlordane, alpha(cis)	5103-71-9	2.5	µg/kg	2.5	µg/kg
DDD, o,p'-	53-19-0	2.5	µg/kg	2.5	µg/kg
DDD, p,p'-	72-54-8	5.0	µg/kg	5.0	µg/kg
DDE, o,p'-	3424-82-6	2.5	µg/kg	2.5	µg/kg
DDE, p,p'-	72-55-9	5.0	µg/kg	5.0	µg/kg
DDT, o,p'-	789-02-6	2.5	µg/kg	2.5	µg/kg
DDT, p,p'-	50-29-3	5.0	µg/kg	5.0	µg/kg
Dieldrin	60-57-1	5.0	µg/kg	5.0	µg/kg
Endosulfan I	959-98-8	2.5	µg/kg	2.5	µg/kg
Endosulfan II	33213-65-9	5.0	µg/kg	5.0	µg/kg

PARAMETER	CAS NUMBER	BIOLOGICAL CRQL	UNITS*	SEDIMENT CRQL	UNITS**
Endosulfan sulfate	1031-07-8	5.0	µg/kg	5.0	µg/kg
Endrin	72-20-8	5.0	µg/kg	5.0	µg/kg
Endrin aldehyde	7421-93-4	5.0	µg/kg	5.0	µg/kg
Endrin ketone	53494-70-5	5.0	µg/kg	5.0	µg/kg
Heptachlor	76-44-8	2.5	µg/kg	2.5	µg/kg
Heptachlor Epoxide	1024-57-3	2.5	µg/kg	2.5	µg/kg
Hexachlorobenzene	118-74-1	2.5	µg/kg	2.5	µg/kg
Methoxychlor	72-43-5	25.0	µg/kg	25.0	µg/kg
Mirex	2385-85-5	5.0	µg/kg	5.0	µg/kg
cis- Nonachlor	5103-73-1	5.0	µg/kg	5.0	µg/kg
trans- Nonachlor	39765-80-5	5.0	µg/kg	5.0	µg/kg
Oxychlordane	27304-13-8	5.0	µg/kg	5.0	µg/kg
Pentachloroanisole	1825-21-4	2.5	µg/kg	2.5	µg/kg
Toxaphene	8001-35-2	75.0	µg/kg	75.0	µg/kg

* wet weight basis
** dry weight basis
µg/kg micrograms per kilogram

Table B.4.1.3.7: Fish Tissue Chemistry Cd, Pb, Hg and Se

TASK 6
INORGANICS
TARGET PARAMETER LIST (TPL)

Method 6020A (U.S. EPA 2007a)

PARAMETER	CAS NUMBER	BIOLOGICAL CRQL	UNITS*	SEDIMENT CRQL	UNITS**
Cadmium	7440-43-9	10.0	µg/kg	200.0	µg/kg
Lead	7439-92-1	70.0	µg/kg	500.0	µg/kg
Mercury	7439-97-6	20.0	µg/kg	20.0	µg/kg
Selenium	7782-49-2	100	µg/kg	500	µg/kg

* wet weight basis
** dry weight basis
µg/kg micrograms per kilogram

Table B2.4.1.3.8: Fish Tissue Chemistry Metals Medium List.

TASK 6A
INORGANICS
TARGET PARAMETER LIST (TPL)

Method 6020A (U.S. EPA 2007a)

PARAMETER	CAS NUMBER	BIOLOGICAL CRQL	BIOLOGICAL UNITS*	SEDIMENT CRQL	SEDIMENT UNITS**
Cadmium	7440-43-9	10.0	µg/kg	200	µg/kg
Chromium	7440-47-3	100	µg/kg	800	µg/kg
Copper	7440-50-8	100	µg/kg	500	µg/kg
Lead	7439-92-1	70.0	µg/kg	500	µg/kg
Mercury	7439-97-6	20.0	µg/kg	20	µg/kg
Nickel	7440-02-0	1,000	µg/kg	250	µg/kg
Selenium	7782-49-2	100	µg/kg	500	µg/kg
Zinc	7440-66-6	2,000	µg/kg	500	µg/kg

* wet weight basis
** dry weight basis
µg/kg micrograms per kilogram

Table B.4.1.3.9: Fish Tissue Chemistry Metals Long List.

TASK 6B
INORGANICS
TARGET PARAMETER LIST (TPL)

Method 6020A (U.S. EPA 2007a)

PARAMETER	CAS NUMBER	BIOLOGICAL CRQL	BIOLOGICAL UNITS*	SEDIMENT CRQL	SEDIMENT UNITS**
Aluminum	7429-90-5	5,000	µg/kg	1,500	µg/kg
Antimony	7440-36-0	2,000	µg/kg	1,000	µg/kg
Arsenic	7440-38-2	1,000	µg/kg	2,000	µg/kg
Barium	7440-39-3	5,000	µg/kg	1,500	µg/kg
Beryllium	7440-41-7	500	µg/kg	1,500	µg/kg
Cadmium	7440-43-9	10.0	µg/kg	200	µg/kg
Calcium	7440-70-2	500,000	µg/kg	5,000	µg/kg
Chromium	7440-47-3	100	µg/kg	800	µg/kg
Cobalt	7440-48-4	5,000	µg/kg	200	µg/kg
Copper	7440-50-8	100	µg/kg	500	µg/kg
Iron	7439-89-6	5,000	µg/kg	5,000	µg/kg
Lead	7439-92-1	70.0	µg/kg	500	µg/kg
Magnesium	7439-95-4	500,000	µg/kg	3,000	µg/kg
Manganese	7439-96-5	1,500	µg/kg	200	µg/kg
Mercury	7439-97-6	20.0	µg/kg	20.0	µg/kg
Nickel	7440-02-0	1,000	µg/kg	250	µg/kg
Potassium	7440-09-7	500,000	µg/kg	60,000	µg/kg

PARAMETER	CAS NUMBER	BIOLOGICAL CRQL	BIOLOGICAL UNITS*	SEDIMENT CRQL	SEDIMENT UNITS**
Selenium	7782-49-2	100	µg/kg	500	µg/kg
Silver	7440-22-4	500	µg/kg	200	µg/kg
Sodium	7440-23-5	10,000	µg/kg	6,000	µg/kg
Thallium	7440-28-0	1,000	µg/kg	500	µg/kg
Vanadium	7440-62-2	2,000	µg/kg	1,000	µg/kg
Zinc	7440-66-6	2,000	µg/kg	500	µg/kg

* wet weight basis
** dry weight basis
µg/kg micrograms per kilogram

Table B.4.1.3.10: Fish Tissue Chemistry Inorganics.

TASK 6C
INORGANICS
TARGET PARAMETER LIST (TPL)

EPA Method OIA-1677 (U.S. EPA 2004b)
EPA Method 9012B (U.S. EPA 2004a)
EPA Method 9014 (U.S. EPA 1996)

PARAMETER	CAS NUMBER	BIOLOGICAL CRQL	BIOLOGICAL UNITS*	SEDIMENT CRQL	SEDIMENT UNITS**
Total Cyanide	57-12-5	NA	NA	250	µg/kg

NA Not Applicable.
** dry weight basis
µg/kg micrograms per kilogram

TASK 6D
ACID VOLATILE SULFIDE (AVS) AND SIMULTANEOUSLY EXTRACTED METALS (SEM)
TARGET PARAMETER LIST (TPL)

Method Draft: (U.S. EPA 1991a**)**

PARAMETER	CAS NUMBER OR OWQ IDENTIFIER	BIOLOGICAL CRQL	BIOLOGICAL UNITS*	SEDIMENT CRQL	SEDIMENT UNITS**
Acid Volatile Sulfide@	E-AVS	NA	NA	20.0	µg/kg
Cadmium @	7440-43-9	NA	NA	500	µg/kg
Copper @	7440-50-8	NA	NA	500	µg/kg
Lead @	7439-92-1	NA	NA	500	µg/kg
Mercury @	7439-97-6	NA	NA	20.0	µg/kg
Nickel @	7440-02-0	NA	NA	500	µg/kg
Zinc @	7440-66-6	NA	NA	500	µg/kg

NA Not Applicable.
** dry weight basis
µg/kg micrograms per kilogram
@ Must also be reported in micromoles/gram (µmole/g) dry sediment weight basis. The sample data summary report must include a proper calculation of the ratio of simultaneously extracted metals to acid volatile sulfides as described in Section 14 page 16 of the analytical method (U.S. EPA, 1991).

Table B.4.1.3.11: Fish Tissue Chemistry Organotin.

TASK 6E
ORGANOTIN
TARGET PARAMETER LIST (TPL)

Method 8323 (U.S. EPA 2003)

		BIOLOGICAL		SEDIMENT	
PARAMETER	**CAS NUMBER**	**CRQL**	**UNITS***	**CRQL**	**UNITS****
Tributyltin	688-73-3	10.0	µg/kg	10.0	µg/kg

NA Not Applicable.
* wet weight basis
** dry weight basis
µg/kg micrograms per kilogram

Table B.4.1.3.12: Fish Tissue Chemistry Total Mercury and Methyl Mercury

TASK 6F
Total Mercury
Methyl Mercury

Method 1630 (U.S. EPA 2001b)
Method 1631 (U.S. EPA 2002b)

		BIOLOGICAL		SEDIMENT	
PARAMETER	**CAS NUMBER**	**CRQL**	**UNITS***	**CRQL**	**UNITS****
Mercury	7439-97-6	1.0	µg/kg	1.0	µg/kg
Methyl Mercury	22967-92-6	1.0	µg/kg	1.0	µg/kg

NA Not Applicable.
* wet weight basis
** dry weight basis
µg/kg micrograms per kilogram

Table B.4.1.3.13: Fish Tissue Chemistry Acid Extractable Semivolatile Organic Compounds

TASK 7

ACID EXTRACTABLE SEMIVOLATILE ORGANICS
TARGET PARAMETER LIST (TPL)

Method 8270E (U.S. EPA 2018)

		BIOLOGICAL		SEDIMENT	
PARAMETER	**CAS NUMBER**	**CRQL**	**UNITS***	**CRQL**	**UNITS****
Benzoic acid	65-85-0	330	µg/kg	660	µg/kg
Chlorophenol, 2-	95-57-8	330	µg/kg	660	µg/kg
Dichlorophenol, 2,4-	120-83-2	330	µg/kg	660	µg/kg
Dimethylphenol, 2,4-	105-67-9	330	µg/kg	660	µg/kg
Nitrophenol, 2-	88-75-5	330	µg/kg	660	µg/kg
Dinitrophenol, 2,4-	51-28-5	330	µg/kg	660	µg/kg
Methylphenol, 2-	95-48-7	330	µg/kg	660	µg/kg
Methylphenol, 4- -	106-44-5	330	µg/kg	660	µg/kg
4-Chloro-3-Methylphenol	59-50-7	330	µg/kg	660	µg/kg
2-Methyl-4,6-dinitrophenol	534-52-1	330	µg/kg	660	µg/kg
Nitrophenol, 4-	100-02-7	330	µg/kg	660	µg/kg
Pentachlorophenol	87-86-5	330	µg/kg	660	µg/kg
Phenol	108-95-2	330	µg/kg	660	µg/kg
Trichlorophenol, 2,4,5-	95-95-4	330	µg/kg	660	µg/kg
Trichlorophenol, 2,4,6-	88-06-02	330	µg/kg	660	µg/kg

* wet weight basis
** dry weight basis
µg/kg micrograms per kilogram

Table B.4.1.3.14: Fish Tissue Chemistry BNA Organics.

TASK 8
BASE/NEUTRAL EXTRACTABLE SEMIVOLATILE ORGANICS
TARGET PARAMETER LIST (TPL)

Method 8270E (U.S. EPA 2018)

		BIOLOGICAL		SEDIMENT	
PARAMETER	**CAS NUMBER**	**CRQL**	**UNITS***	**CRQL**	**UNITS****
Acenaphthylene	208-96-8	330	µg/kg	660	µg/kg
Acenaphthene	83-32-9	330	µg/kg	660	µg/kg
Anthracene	120-12-7	330	µg/kg	660	µg/kg
Benzo(a)anthracene	56-55-3	330	µg/kg	660	µg/kg
Benzo(a)pyrene	50-32-8	330	µg/kg	660	µg/kg
Benzo(b)fluoranthene	205-99-2	330	µg/kg	660	µg/kg
Benzo(k)fluoranthene	207-08-9	330	µg/kg	660	µg/kg
Benzo(g,h,i)perylene	191-24-2	330	µg/kg	660	µg/kg
Benzyl alcohol	100-51-6	330	µg/kg	660	µg/kg
Bis(2-chloroethoxy) Methane	111-91-1	330	µg/kg	660	µg/kg
Bis(2-chloroethyl) Ether	111-44-4	330	µg/kg	660	µg/kg
Oxybis-(1-Chloropropane), 2,2'-	108-60-1	330	µg/kg	660	µg/kg
Bis(2-ethylhexyl) Phthalate	117-81-7	330	µg/kg	660	µg/kg
Bromophenyl Phenyl Ether, 4-	101-55-3	330	µg/kg	660	µg/kg
Butylbenzylphthalate	85-68-7	330	µg/kg	660	µg/kg
Carbazole	86-74-8	330	µg/kg	660	µg/kg
Chloroaniline, 4-	106-47-8	330	µg/kg	660	µg/kg
Chloronaphthalene, 2-	91-58-7	330	µg/kg	660	µg/kg
Chlorophenyl Phenyl Ether, 4-	7005-72-3	330	µg/kg	660	µg/kg
Chrysene	218-01-9	330	µg/kg	660	µg/kg
Dibenzo(a,h)anthracene	53-70-3	330	µg/kg	660	µg/kg
Dibenzofuran	132-64-9	330	µg/kg	660	µg/kg
Di-N-butylphthalate	84-74-2	330	µg/kg	660	µg/kg
Diethylphthalate	84-66-2	330	µg/kg	660	µg/kg
Dimethylphthalate	131-11-3	330	µg/kg	660	µg/kg
Di-N-Octylphthalate	117-84-0	330	µg/kg	660	µg/kg
Dichlorobenzene, 1,2-	95-50-1	330	µg/kg	660	µg/kg
Dichlorobenzene, 1,3-	541-73-1	330	µg/kg	660	µg/kg
Dichlorobenzene, 1,4-	106-46-7	330	µg/kg	660	µg/kg
Dichlorobenzidine, 3,3'-	91-94-1	330	µg/kg	660	µg/kg
Dinitrotoluene, 2,4-	121-14-2	330	µg/kg	660	µg/kg

Table B.4.1.3.14 Task 8 continued

PARAMETER	CAS NUMBER	BIOLOGICAL CRQL	BIOLOGICAL UNITS*	SEDIMENT CRQL	SEDIMENT UNITS**
Dinitrotoluene, 2,6-	606-20-2	330	µg/kg	660	µg/kg
Fluorene	86-73-7	330	µg/kg	660	µg/kg
Fluoranthene	206-44-0	330	µg/kg	660	µg/kg
Hexachlorobenzene	118-74-1	330	µg/kg	660	µg/kg
Hexachlorobutadiene	87-68-3	330	µg/kg	660	µg/kg
Hexachlorocyclopentadiene	77-47-4	330	µg/kg	660	µg/kg
Hexachloroethane	67-72-1	330	µg/kg	660	µg/kg
Indeno(1,2,3-cd)pyrene	193-39-5	330	µg/kg	660	µg/kg
Isophorone	78-59-1	330	µg/kg	660	µg/kg
Methylnaphthalene, 2-	91-57-6	330	µg/kg	660	µg/kg
Naphthalene	91-20-3	330	µg/kg	660	µg/kg
Nitroaniline, 2-	88-74-4	330	µg/kg	660	µg/kg
Nitroaniline, 3-	99-09-2	330	µg/kg	660	µg/kg
Nitroaniline, 4-	100-01-6	330	µg/kg	660	µg/kg
Nitrobenzene	98-95-3	330	µg/kg	660	µg/kg
Nitrosodiphenylamine, N-(1)	86-30-6	330	µg/kg	660	µg/kg
Nitroso-di-n-propylamine, -N	621-64-7	330	µg/kg	660	µg/kg
Phenanthrene	85-01-8	330	µg/kg	660	µg/kg
Pyrene	129-00-0	330	µg/kg	660	µg/kg
Trichlorobenzene, 1,2,4-	120-82-1	330	µg/kg	660	µg/kg

NA Not Applicable.
* wet weight basis
** dry weight basis
µg/kg micrograms per kilogram

Table B.4.1.3.15: Fish Tissue Chemistry Volatile Organic Compounds.

Task 9
VOLATILE ORGANICS
TARGET PARAMETER LIST (TPL)

Method 8260D (U.S. EPA 2006)

PARAMETER	CAS NUMBER	BIOLOGICAL		SEDIMENT	
		CRQL	UNITS*	CRQL	UNITS**
Acetone	67-64-1	10.0	µg/kg	10.0	µg/kg
Benzene	71-43-2	5.0	µg/kg	5.0	µg/kg
Bromodichloromethane	75-27-4	5.0	µg/kg	5.0	µg/kg
Bromomethane	74-83-9	10.0	µg/kg	10.0	µg/kg
Butanone, 2- (MEK)	78-93-3	10.0	µg/kg	10.0	µg/kg
Carbon Disulfide	75-15-0	5.0	µg/kg	5.0	µg/kg
Chlorobenzene	108-90-7	5.0	µg/kg	5.0	µg/kg
Chloroethane	75-00-3	10.0	µg/kg	10.0	µg/kg
Chloroethyl-Vinyl-Ether, 2-	110-75-8	10.0	µg/kg	10.0	µg/kg
Chloromethane	74-87-3	10.0	µg/kg	10.0	µg/kg
Dibromochloromethane	124-48-1	5.0	µg/kg	5.0	µg/kg
Dichloroethane, 1,1-	75-34-3	5.0	µg/kg	5.0	µg/kg
Dichloroethane, 1,2,-	107-06-2	5.0	µg/kg	5.0	µg/kg
Dichloroethene, 1,1-	75-35-4	5.0	µg/kg	5.0	µg/kg
Dichloroethene, 1,2- (total)	540-59-0	5.0	µg/kg	5.0	µg/kg
Dichloromethane (Methylene chloride)	75-09-2	5.0	µg/kg	5.0	µg/kg
Dichloropropane,1,2-	78-87-5	5.0	µg/kg	5.0	µg/kg
Dichloropropene, cis-1,3-	10061-01-5	5.0	µg/kg	5.0	µg/kg
Dichloropropene, trans-1,3-	10061-02-6	5.0	µg/kg	5.0	µg/kg
Ethylbenzene	100-41-4	5.0	µg/kg	5.0	µg/kg
Hexanone, 2- (MBK)	591-78-6	10.0	µg/kg	10.0	µg/kg
Methyl-2-pentanone, 4-	108-10-1	10.0	µg/kg	10.0	µg/kg
Styrene	100-42-5	5.0	µg/kg	5.0	µg/kg
Tetrachloroethane, 1,1,2,2-	79-34-5	5.0	µg/kg	5.0	µg/kg
Tetrachloroethene,	127-18-4	5.0	µg/kg	5.0	µg/kg
Tetrachloromethane (Carbon tetrachloride)	56-23-5	5.0	µg/kg	5.0	µg/kg
Tribromomethane (Bromoform)	75-25-2	5.0	µg/kg	5.0	µg/kg
Trichloroethane, 1,1,1-	71-55-6	5.0	µg/kg	5.0	µg/kg
Trichloroethane, 1,1,2-	79-00-5	5.0	µg/kg	5.0	µg/kg
Trichloroethene	79-01-6	5.0	µg/kg	5.0	µg/kg
Trichloromethane (Chloroform)	67-66-3	5.0	µg/kg	5.0	µg/kg
Toluene	108-88-3	5.0	µg/kg	5.0	µg/kg
Vinyl Acetate	108-05-4	10.0	µg/kg	10.0	µg/kg
Vinyl Chloride	75-01-4	10.0	µg/kg	10.0	µg/kg
Xylenes, Total	1330-20-7	5.0	µg/kg	5.0	µg/kg

NA Not Applicable.
* wet weight basis
** dry weight basis
µg/kg micrograms per kilogram

Table B.4.1.3.16: Fish Tissue Chemistry Polynuclear Aromatic Hydrocarbons.

TASK 10
POLYNUCLEAR AROMATIC HYDROCARBONS
TARGET PARAMETER LIST (TPL)

Method GCMS-SIM HP-5973
Method 8270D (U.S. EPA 2007e)
Method 8310 (U.S. EPA 1986)

		BIOLOGICAL		SEDIMENT	
PARAMETER	**CAS NUMBER**	**CRQL**	**UNITS***	**CRQL**	**UNITS****
Naphthalene	91-2-03	100	ug/kg	33.0	ug/kg
1-Methyl Naphthalene	90-12-0	100	ug/kg	16.0	ug/kg
2-Methyl Naphthalene	91-57-6	100	ug/kg	16.0	ug/kg
Acenaphthylene	208-96-8	125	ug/kg	67.0	ug/kg
Acenaphthene	83-32-9	50.0	ug/kg	33.0	ug/kg
Fluorene	86-73-7	10.0	ug/kg	3.3	ug/kg
Phenanthrene	85-01-8	5.0	ug/kg	3.3	ug/kg
Anthracene	120-12-7	7.5	ug/kg	3.3	ug/kg
Chrysene	218-01-9	5.0	ug/kg	3.3	ug/kg
Fluoranthene	206-44-0	7.5	ug/kg	5.0	ug/kg
Pyrene	129-00-0	2.0	ug/kg	3.3	ug/kg
Benzo (a) anthracene	56-55-3	5.0	ug/kg	3.3	ug/kg
Benzo (b) fluoranthene	205-99-2	5.0	ug/kg	3.3	ug/kg
Benzo (k) fluoranthene	207-08-9	5.0	ug/kg	3.3	ug/kg
Benzo (a) pyrene	50-32-8	10.0	ug/kg	3.3	ug/kg
Dibenzo (a,h) anthracene	53-70-3	15.0	ug/kg	6.7	ug/kg
Benzo (g,h,i) perylene	191-24-2	12.5	ug/kg	6.7	ug/kg
Indeno (1,2,3-c,d)	193-39-5	7.5	ug/kg	6.7	ug/kg

NA Not Applicable.
* wet weight basis
** dry weight basis
ug/kg micrograms per kilogram

Table B.4.1.3.17: Fish Tissue Chemistry Brominated Diphenyl Ether Compounds.

TASK 11
POLYBROMINATED DIPHENYL ETHERS (PBDE)
TARGET PARAMETER LIST

Method 1614A (DRAFT) Tissues and Soils by HRGC/HRMS (U.S. EPA 2010b)

Congener	IUPAC #	OWQ Identifier Number[7]	MDL µg/kg (ww)	CRQL µg/kg (ww)
2-MonoBDE	1	BDE-1	0.5	1.5
3-MonoBDE	2	BDE-2	0.48	1.5
4-MonoBDE	3	BDE-3	0.48	1.5
2,4-DiBDE	7	BDE-7	0.03	0.1
2,4'-DiBDE	8	BDE-8	0.03	0.1
2,6-DiBDE	10	BDE-10	0.03	0.1
3,3'-DiBDE	11	BDE-11	0.00	0.1
3,4-DiBDE	12	BDE-12	0.03	0.1
3,4'-DiBDE	13	BDE-13	0.03	0.1
4,4'-DiBDE	15	BDE-15	0.03	0.1
2,2',4-TriBDE	17	BDE-17	0.03	0.1
2,3',4-TriBDE	25	BDE-25	0.03	0.1
2,4,4'-TriBDE	28	BDE-28	0.03	0.1
2,4,6-TriBDE	30	BDE-30	0.03	0.1
2,4',6-TriBDE	32	BDE-32	0.03	0.1
2',3,4-TriBDE	33	BDE-33	0.00	0.1
3,3',4-TriBDE	35	BDE-35	0.03	0.1
3,4,4'-TriBDE	37	BDE-37	0.03	0.1
2,2',4,4'-TetraBDE	47	BDE-47	0.02	0.1
2,2',4,5'-TetraBDE	49	BDE-49	0.02	0.1
2,3',4,4'-TetraBDE	66	BDE-66	0.03	0.1
2,3',4',6-TetraBDE	71	BDE-71	0.02	0.1
2,4,4',6-TetraBDE	75	BDE-75	0.02	0.1
3,3',4,4'-TetraBDE	77	BDE-77	0.02	0.1
2,2',3,4,4'-PentaBDE	85	BDE-85	0.03	0.1
2,2',4,4',5-PentaBDE	99	BDE-99	0.03	0.1
2,2',4,4',6-PentaBDE	100	BDE-100	0.02	0.1
2,3,3',4,4'-PentaBDE	105	BDE-105	0.02	0.1
2,3,4,5,6-PentaBDE	116	BDE-116	0.02	0.1
2,3',4,4',6-PentaBDE	119	BDE-119	0.02	0.1
3,3',4,4',5-PentaBDE	126	BDE-126	0.02	0.1
2,2',3,4,4',5'-HexaBDE	138	BDE-138	0.08	0.2
2,2',3,4,4',6'-HexaBDE	140	BDE-140	0.06	0.2
2,2',4,4',5,5'-HexaBDE	153	BDE-153	0.07	0.2
2,2',4,4',5,6'-HexaBDE	154	BDE-154	0.05	0.2
2,2',4,4',6,6'-HexaBDE	155	BDE-155	0.06	0.2
2,3,4,4',5,6-HexaBDE	166	BDE-166	0.00	0.2
2,2',3,4,4',5,6-HeptaBDE	181	BDE-181	0.07	0.2
2,2',3,4,4',5',6-HeptaBDE	183	BDE-183	0.05	0.2
2,3,3',4,4',5,6-HeptaBDE	190	BDE-190	0.10	0.3

7 Non-numeric CAS Numbers have been assigned by IDEM/WABP chemists for parameters which do not have a CAS Number assigned by the Chemical Abstracts Service of the American Chemical Society.

Congener	IUPAC #	OWQ Identifier Number[7]	MDL µg/kg (ww)	CRQL µg/kg (ww)
2,2',3,3',4,4',5,5',6-NonaBDE	206	BDE-206	0.14	0.5
2,2',3,3',4,4',5,6,6'-NonaBDE	207	BDE-207	0.14	0.5
2,2',3,3',4,5,5',6,6'-NonaBDE	208	BDE-208	0.14	0.5
2,2',3,3',4,4',5,5',6,6'-DecaBDE	209	BDE-209	1.10	3.5

IUPAC=International Union of Pure and Applied Chemistry
MDL=method detection limit DL=detection limit.

Table B.4.1.3.18: Fish Tissue Chemistry Perfluoroalkyl Acids (PFAA).

TASK 12
TARGET PARAMETER LIST (TPL)

Method: PACE PFAS DoD 36 (Pace 2020)

PARAMETER	CAS Number	BIOLOGICAL CRQL	UNITS**
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.2413	µg/kg ww
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	763051-92-9	0.235	µg/kg ww
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	0.2363	µg/kg ww
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.2338	µg/kg ww
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.2375	µg/kg ww
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.2413	µg/kg ww
9-Chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	0.2325	µg/kg ww
N-ethyl perfluorooctanesulfonamideoacetic acid (NEtFOSAA)	2991-50-6	0.25	µg/kg ww
N-ethylperfluorooctane sulfonamide (NEtFOSA)	4151-50-2	0.25	µg/kg ww
N-ethylperfluorooctane sulfonamidoethanol (NEtFOSE)	1691-99-2	0.25	µg/kg ww
N-methyl perfluorooctanesulfonamideoacetic acid (NMeFOSAA)	2355-31-9	0.25	µg/kg ww
N-methylperfluorooctane sulfonamide (NMeFOSA)	31506-32-8	0.25	µg/kg ww
N-methylperfluorooctane sulfonamidoethanol (NMeFOSE)	24448-09-7	0.25	µg/kg ww
Perfliorohexanesulfonate (C6, PFHxS)*	355-46-4	0.2275	µg/kg ww
Perfluorobutanesulfonate (C4, PFBS)*	375-73-5	0.2213	µg/kg ww
Perfluorobutanoic acid (C4, PFBA)*	375-22-4	0.25	µg/kg ww
Perfluorodecanesulfonate (C10, PFDS)	335-77-3	0.2413	µg/kg ww
Perfluorodecanoic acid (C10, PFDA)*	335-76-2	0.25	µg/kg ww
Perfluorododecanesulfonic acid (PFDoS)	79780-39-5	0.2425	µg/kg ww
Perfluorododecanoic acid (C12, PFDoA)	307-55-1	0.25	µg/kg ww
Perfluoroheptanesulfonate (C7, PFHpS)	375-92-8	0.2375	µg/kg ww

PARAMETER	CAS Number	BIOLOGICAL CRQL	UNITS**
Perfluoroheptanoic acid (C7, PFHpA)	375-85-9	0.25	µg/kg ww
Perfluorohexadecanoic acid (PFHxDA)	67905-19-5	0.25	µg/kg ww
Perfluorohexanoic acid (C6, PFHxA)*	307-24-4	0.25	µg/kg ww
Perfluorononanesulfonic acid (PFNS)	68259-12-1	0.24	µg/kg ww
Perfluorononanoic acid (C9, PFNA)*	375-95-1	0.25	µg/kg ww
Perfluorooctandecanoic acid (PFODA)	16517-11-6	0.25	µg/kg ww
Perfluorooctanesulfonamide (PFOSA)	754-91-6	0.25	µg/kg ww
Perfluorooctanesulfonate (C8, PFOS)*	1763-23-1	0.2313	µg/kg ww
Perfluorooctanoic acid (C8, PFOA)*	335-67-1	0.25	µg/kg ww
Perfluoropentanesulfonic acid (PFPeS)	2706-91-4	0.235	µg/kg ww
Perfluoropentanoic acid (C5, PFPeA)	2706-90-3	0.25	µg/kg ww
Perfluorotetradecanoic acid (C14, PFTeDA)	376-06-7	0.25	µg/kg ww
Perfluorotridecanoic acid (C13, PFTrDA)	72629-94-8	0.25	µg/kg ww
Perfluoroundodecanoic acid (C11, PFUnA)	2058-94-8	0.25	µg/kg ww

* Commonly found in the environment
** All results reported as µg/kg wet weight

B.4.4. Watershed Characterization Program Parameters:

Target compounds and parameters for specific sites are detailed in the sampling and analysis workplan for Watershed Characterization Program Project. The parameters are chosen from the following tables. Other parameters may be added for a project to meet the goals and objectives detailed in the sampling and analysis workplan. Alternate and equivalent test methods which meet or exceed the IDEM CRQLs may be used by the contractor laboratory with IDEM approval.

General Chemistries	CAS NUMBER OR OWQ IDENTIFIER	Method	IDEM CRQL (mg/L)
Alkalinity (as $CaCO_3$)	E-14506	SM2320B	20.0
Chloride	16887-00-6	EPA 300.0	0.06
Hardness (as $CaCO_3$)	E-11778	SM2340B	0.4
Solids, Dissolved Total (TDS)	E-10173	SM2540C	10.0
Solids, Suspended Total, (TSS)	E-10151	SM2540D	4.0
Solids, Total (TS)	E-10151	SM2540B	1.0
Sulfate	14808-79-8	EPA 300.0	0.05
Calcium	7440-70-2	EPA 200.7	0.020
Magnesium	7439-95-4	EPA 200.7	0.095

Nutrients:	CAS NUMBER OR OWQ IDENTIFIER	Method	IDEM CRQL (mg/L)
COD	E-10117	EPA 410.4	3.0
Nitrogen, Ammonia	7664-41-7	EPA 350.1	0.01
Nitrogen, Nitrate+Nitrite	E-10128	EPA 353.2	0.05
Phosphorus, Total	7723-14-0	EPA 365.1	0.01
TKN	E-10264	EPA 351.2	0.10
TOC	E-10195	SM5310C	1.0

Bacteriology:	CAS NUMBER OR OWQ IDENTIFIER	Method	IDEM CRQL (MPN/100mL)
E. coli	ECOLI	SM 9223B or SM9223B(Colilert-18)	1.0
Total *Coliforms*	TCOLI	SM 9223B or SM9223B(Colilert-18)	1.0

B.4.5. Cyanobacteria and Cyanotoxin Monitoring in Selected Lakes Parameters:

Target compounds and parameters for specific sites are detailed in the sampling and analysis workplan for a project in this program. The parameters are chosen from the following tables. In addition, other cyanotoxins may be added in future years to better characterize risks to human health, animal health, and aquatic life. Alternate and equivalent test methods which meet or exceed the IDEM CRQLs may be used by the contractor laboratory with IDEM approval.

Nutrients and Cyanotoxins	CAS NUMBER OR OWQ IDENTIFIER	Method	IDEM CRQL
Nitrogen, Ammonia	7664-41-7	SM4500NH3-G	0.1 mg/L
Nitrogen, Nitrate+Nitrite	E-10128	SM4500NO3-F	0.5 mg/L
Phosphorus, Total	7723-14-0	SM4500P-E	0.03 mg/L
TKN	E-10264	SM4500N(Org)-	0.3 mg/L
Phosphorus, ortho (Dissolved)	14265-44-2	EPA 365.2	0.01 mg/L
Anatoxin-a	64285-06-9	Abraxis-520060	0.15 µg/L
Cylindrospermopsin	143545-90-8	Abraxis-522011	0.05 µg/L
Microcystin (Total)	101043-37-2	EPA 546	0.15 µg/L
Saxitoxin	35523-89-8	Abraxis-52255B	0.02 µg/L
Total plankton count & species distribution	Not applicable		Cells/ml
Algae, blue-green (phylum cyanophyta) density	E52457108		Cells/ml

B.4.6. Reference Site Monitoring Program Parameters:

Target compounds and parameters for specific sites are detailed in the sampling and analysis workplan for a Reference Site Monitoring Project. The parameters are chosen from the following tables.

General Chemistries	CAS NUMBER OR OWQ IDENTIFIER	Method	IDEM CRQL (mg/L)
Alkalinity (as $CaCO_3$)	E-14506	SM2320B	20.0
Chloride	16887-00-6	EPA 300.0	0.06
Hardness (as $CaCO_3$)	E-11778	SM2340B	0.4
Solids, Dissolved Total (TDS)	E-10173	SM2540C	10.0
Solids, Suspended Total, (TSS)	E-10151	SM2540D	4.0
Solids, Total (TS)	E-10151	SM2540B	1.0
Sulfate	14808-79-8	EPA 300.0	0.05
Calcium	7440-70-2	EPA 200.7	0.020
Magnesium	7439-95-4	EPA 200.7	0.095

Nutrients:	CAS NUMBER OR OWQ IDENTIFIER	Method	IDEM CRQL (mg/L)
COD	E-10117	EPA 410.4	3.0
Nitrogen, Ammonia	7664-41-7	EPA 350.1	0.01
Nitrogen, Nitrate+Nitrite	E-10128	EPA 353.2	0.05
Phosphorus, Total	7723-14-0	EPA 365.1	0.01
TKN	E-10264	EPA 351.2	0.10
TOC	E-10195	SM5310C	1.0
DOC	E-DOC	SM5310C	1.0

Total & Dissolved Metals:	CAS NUMBER OR OWQ IDENTIFIER	Method	IDEM CRQL (µg/L)
Aluminum	7429-90-5	EPA 200.8	10.0
Antimony	7440-36-0	EPA 200.8	1.0
Arsenic	7440-38-2	EPA 200.8	2.0
Cadmium	7440-43-9	EPA 200.8	1.0
Chromium, Total (VI + III)	7440-47-3	EPA 200.8	3.0
Copper	7440-50-8	EPA 200.8	2.0
Lead	7439-92-1	EPA 200.8	2.0
Nickel	7439-92-1	EPA 200.8	1.5
Selenium	7440-02-0	EPA 200.8	4.0
Silver	7782-49-2	EPA 200.8	0.3
Zinc	7440-66-6	EPA 200.8	5.0

B.4.7. Program Parameters for: Performance Measures Monitoring and Special Projects

Target compounds, matrices, and parameters for each of the Surface Water Quality Monitoring Programs and Projects are selected from Tables B.4.1.1 – B.4.1.6. Parameters, test methods, and CRQLs for each specific project are detailed in the project-specific workplan after consideration of potential sources of pollution, matrix, data quality objectives, and intended data use.

B.4.8. Field Parameter Measurements

Dissolved oxygen, pH, water temperature, specific conductance, and dissolved oxygen percent saturation will be measured with a data sonde during each sampling event, regardless of the sample type being collected. Measurement procedures and operation of the data sonde shall be performed according to the manufacturers' manuals (IDEM 2020a). Turbidity will be measured with a Hach turbidity kit, and the meter number written in the comments under the field parameter measurements (IDEM 2020b). If a Hach turbidity kit is not available, the data sonde measurement for turbidity will be recorded and noted in the comments. All field parameter measurements and weather codes will be recorded on the IDEM Stream Sampling Field Data Sheet (Attachment 1) with other sampling observations. A digital photo will also be taken upstream and downstream of the site during each sampling event (IDEM 2018b).

Table 14: Field Parameters showing method and IDEM quantification limit.

Parameters	Method	IDEM Quantification Limit
Dissolved Oxygen (data sonde optical)	ASTM D888-09	0.05 mg/L
Dissolved Oxygen % Saturation (data sonde optical aka Luminescence Sensor)	ASTM D888-09	0.05 %
Dissolved Oxygen (membrane probe)	SM4500-OG [2]	0.05 mg/L
pH (data sonde)	U.S. EPA 150.2	0.10 SU
pH (field pH meter)	SM 4500H-B [2]	0.10 SU
Specific Conductance (data sonde)	SM 2510B	1.00 µmhos/cm
Temperature (data sonde)	SM 2550B(2)	0.1 Degrees Celsius (°C)
Temperature (field meter)	SM 2550B(2) [2]	0.1 Degrees Celsius (°C)
Turbidity (data sonde)	SM 2130B	0.02 NTU [3]
Turbidity (Hach™ turbidity kit)	U.S. EPA 180.1	0.05 NTU [3]

[1] SM = Standard Method
[2] Method used for Field Calibration Check
[3] NTU = Nephelometric Turbidity Unit(s)

If there is a failure, disruption, or other breakdown in the laboratory analytical system:

What will be done? Corrective action will be taken and failures noted in reports.

The program manager is responsible for implementing the change or corrective action.

The laboratory turnaround time needed is: *30 days for water chemistries and 90 days for fish tissues and sediment chemistries. In addition, the laboratory contracts allow 48 hour and 14 day turnaround time for urgent samples.*

B.5. Quality Controls (also A.7.1.)

Identified below are the QC activities needed for field sampling.

Table 14: Quality Controls for Field Sampling

Parameters and Test Procedure	Measurement	Duplicate Sample	Reference Standards	Calibration Verification Standard	Equipment/ Field Blank	Trip Blank
Sample Collection	1/sample	Maximum of 1 per sampling event or 1/20	n/a	n/a	1/Set	1/Set, VOC, and Bacteria
Stream Flow and Physical Measurements	1/sample	n/a	Calibrate measurement equipment each yr. Inspect before each sampling trip.	n/a	n/a	n/a
Temperature	1/sample	n/a	Calibrate thermometers each yr.	n/a	n/a	n/a
pH	1/sample	1/10	pH buffer stds. 1/10 locations	1/10 End of batch	n/a	n/a
Dissolved Oxygen	1/sample	1/sampling event	Calibrate before each sampling event.	separate DO Probe 1/sampling trip or if DO is less than 4.0 mg/L	n/a	n/a
Sediment Oxygen Demand	1/sample		DO at each location	n/a	n/a	n/a
Tot. Residual Chlorine	1/sample				Blank each location	n/a
Data sonde Tests Conductivity Turbidity	1/sample		Calibrate before each sampling trip	1/10 End of batch		n/a

Identified below are the QC activities needed for laboratory analysis.

Table 15: Quality Controls for Laboratory Analysis

LABORATORY QUALITY CONTROL CHECK FREQUENCIES									
Parameters and Test Procedures	**Calibration[8] and/or Verification**	**Sample Lab Duplicate**	**MS/ MSD[9]**	**LCS**	**Method Blank**	**External QC Standard**	**Surrogate**	**Serial Dilution**	**Interference Check**
Metals	1/10	1/20	1/20	1/20	1/run	1/20	n/a	1/run w/ dilutions	2/run
Inorganic Chemicals, & Nutrients	1/run	1/20	1/20	1/run	1/run	1/run	n/a	n/a	n/a
Physical Properties	n/a	1/20	n/a	1/run	1/run	n/a	n/a	n/a	n/a
Volatile Organic Compounds (GC)	every day	1/20	1/10	1/10	1/day	4/day	every sample	n/a	n/a
Volatile Organic Compounds (GC/MS)	every day	1/20	1/20	1/20	1/day	4/day	every sample	n/a	n/a
Semi- Volatile Organic Compounds (GC/MS)	every day	1/20	1/20	1/20	1/20 or 1/extract batch	4/day	every sample	n/a	n/a
PAHs	every day	1/20	1/10	1/10	1/20 or 1/extract batch	4/day	every sample	n/a	n/a
PBDEs	every day	1/20	1/10	1/10	1/20 or 1/extract batch	4/day	every sample	n/a	n/a
Dioxins and Furans	every day	1/20	1/10	1/10	1/20 or 1/extract batch	4/day	every sample	n/a	n/a
PFAS	every day	1/20	1/10	1/10	1/20 or 1/extract batch	4/day	every sample	n/a	n/a
Organotin Compounds (GC/FPD)	every day	1/20	1/20	1/20	1/20 or 1/extract batch	4/day	every sample	n/a	n/a
Pesticides (GC/ECD) [all projects except Fixed Stations - Pesticides]	every day	1/20	1/10	1/10	1/20 or 1/extract batch	4/day	every sample	n/a	n/a
Polychlorinated Biphenyl (PCBs)	every day	1/20	1/10	1/10	1/20 or 1/extract batch	4/day	every sample	n/a	n/a
Cyanotoxins	every day	1/20	1/20	1/20	1/20 or 1/extract batch	1/run	n/a	n/a	n/a
Bacteriology	n/a	1/run	n/a	n/a	1/run	1+ & 1- / run	n/a	when required	n/a
Coliforms (*E. coli & Total coliforms)*	n/a	1/run	n/a	n/a	1/run	1+ & 1- / run	n/a	when required	EC, KP, & PA each media batch
Fixed Stations – Pesticides & SVOCs									
Pesticide Compounds GC/MS EHL-S125 or EPA Method 525.3	every day (LFB)	1/20 minimum	1/20	1/20 for SDWA pest. 1/45 for others	1/20 or 1/extract batch	1/quarter	every sample	every sample	n/a
Glyphosate HPLC/PCD EPA Method 547	every day (LFB)	1/20 minimum	1/20	1/20 for SDWA pest. 1/45 for others	1/20 or 1/extract batch	1/quarter	every sample	every sample	n/a

8 Continuing calibration verification standards (CCVs) shall be run according to the test method or at the beginning and end of a run batch and at a rate of 5%., whichever is greater.

9 Laboratories shall analyze MS/MSDs at a rate of 1 per batch or 5%, whichever is greater.

LABORATORY QUALITY CONTROL CHECK FREQUENCIES									
Parameters and Test Procedures	**Calibration[8] and/or Verification**	**Sample Lab Duplicate**	**MS/ MSD[9]**	**LCS**	**Method Blank**	**External QC Standard**	**Surrogate**	**Serial Dilution**	**Interference Check**
Herbicides/ Pesticides HPLC/PDA (EHL-L131)	1/batch (LFB)	1/20 minimum	1/20	1/20	1/20	N/A	N/A	N/A	n/a

If control limits are exceeded, the laboratory will take corrective action as prescribed in the test procedure. Deviations are documented in the narrative and QA/QC sections of the laboratory report.

The effectiveness of the corrective action is reviewed in the data validation process.

B.6. Instrument and Equipment Testing, Inspection, and Maintenance

Preventive maintenance is the planned upkeep program for measurement instruments which enhances the instrument performance, ensures accurate and precise readings, and prolongs useful life.

Table 16: Instrument/Equipment Testing, Inspection, and Maintenance

Instrument/ Equipment Type	Maintenance Item	Frequency				
		Inspection	Mainte-nance	Testing	Accept-ance Criteria	Corrective Action
Boat	Maintenance/ Repair	Day of use	As needed	Annually		
Boat Trailer	Inspection, repack wheel bearings, check lights, check bunks, check tires	Day of use	Annually	Annually		
Boat Motor	Maintenance of engine oil, lower gear lube, propellers, state of turn of engine	Day of use	Annually	Annually		
Data Sondes - YSI 6600, YSI 6920, YSI EXO1, Hydrolab MS 5, Hydrolab Quanta	Calibration, when being used regularly	Day of use	Weekly	Annually		Recalibration

Instrument/ Equipment Type	Maintenance Item	Frequency				
		Inspection	Mainte-nance	Testing	Accept-ance Criteria	Corrective Action
Electroshock Boxes	Factory Calibration	Day of use	Every two years	Annually		
Electroshock Backpacks	Factory Calibration	Day of use	Every two years	Annually		
Fire Extinguishers	Inspection	Day of use	Annually	Annually		
Generators	Maintenance	Day of use	Annually	Annually		
GPS Units - Trimble R1™	Update software	Day of use	As new software comes available	Annually		
pH Meters - Oakton Acorn Series 4 and 5	Calibration, when being used regularly	Day of use	Weekly	Annually		Recalibration
Turbidimeters Hach 2100P, Hach 2100Q	Calibration, when being used regularly	Day of use	Monthly	Annually		Recalibration
Weighing Scales	Calibration	Day of use	Annually	Every two years		
Fume hoods and ventilators	Inspection & Calibration	Day of use	Annually	Annually		

Each section maintains hardcopy logs of equipment calibration and equipment status. The Preventative Maintenance Program (PMP) is anticipated to replace the hardcopy logs and management.

B.7. Instrument, Equipment Calibration and Frequency

Measurement equipment requires periodic calibration or standardization to reliably produce accurate results. IDEM requires contract labs to follow this QAPP and WAPB RFP 21-66919 (IDEM 2021a) and WAPB RFP 22-68153 (IDEM 2021). Both documents require a quality system which includes standards for calibration and corrective actions. In addition, IDEM may elect to request pertinent QA data, including calibration standards.

Contract laboratories providing analytical services to the WAPB water quality monitoring programs, must document calibration procedures and frequency in compliance with WAPB RFP 21-66919 (IDEM 2021a) and WAPB RFP 22-68153

(IDEM 2021). The requirements specify a QA system is in place and QA/QC data related to the project must be available to IDEM.

Table 17: Instrument/Equipment Calibration and Frequency

Equipment Type	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action	Responsible Staff	SOP Reference
Data Sondes - YSI 6600, YSI 6920, YSI EXO1, Hydrolab MS 5, Hydrolab Quanta	Calibration, when being used regularly	Weekly			WAPB Staff	Calibration of YSI Multiparameter Data Sondes. B-014-OWQ-WAP-XXX-20-T-R0.; EXO User Manual, revision g. Yellow Springs, Ohio.; ProDigital User Manual, revision f. Yellow Springs, Ohio.
pH Meters - Oakton Acorn Series 4 and 5	Calibration, when being used regularly	Weekly			WAPB Staff	
Turbidimeters - Hach 2100P, Hach 2100Q	Calibration, when being used regularly	Monthly			WAPB Staff	
Weighing Scale	Coordinate with Weights and Measures	Every two years	Approval by IN Weights and Measures		WAPB Staff	
DO meters	Calibration, when being used regularly	Weekly			WAPB Staff	

Procedures for field instrument calibration are referenced within individual TSOPs.

B.8. Inspection/Acceptance of Critical Supplies

Supplies and consumables are inspected to requisition requirements and accepted by the project managers per IDEM DOA regulations and the IDEM Quality Management Plan Section 4.0 (IDEM 2018).

B.9. Nondirect Measurements

Table 18: Existing Data to be used in this Data Operation/Study

Data Subject	Data Format	Data Storage Location	Original Intended Use	Acceptance Criteria (for use)	Use Limitations

B.10. Data Management (also see section A.9. Documents and Records)

Records generated by this data operation will be preserved as described in the table at section A.9. above.

Table 19: Mechanism for Avoiding Errors

Potential Data Errors	Mechanism for Avoiding Errors and Data Loss
Database uploads	Per **6.4.4. Data Security Standards,** of the U.S. EPA R5 approved IDEM 2018 Quality Management Plan, the Indiana Office of Information Technology provides an Information Security Network that secures all IDEM information assets.
Hand-entered data	All data entered goes through two rounds of QC to minimize errors in the transcription process.
Lab Reports	WAPB chemists review the data packages to ensure reports are complete and meet all DQOs.

Table 20: Data Handling Equipment

Data Source (project generated or external)	Data Handling Equipment	Procedures to Process, Compile, or Analyze Data

Table 21: Computer Equipment

Required Computer Software or Hardware	Associated Performance Requirements	Process for Demonstrating Acceptability or Required Configuration
Windows Computer		
Microsoft Office Suite, Excel, Access, Word	Microsoft Office	
AIMS II database	Edge, Google Chrome, or Firefox Browsers	
Adobe pdf Reader		

C. Assessment and Oversight

The following assessment activities are planned to track implementation of the data operation to ensure the plan is implemented as prescribed.

Table 22: Data Operation Tracking

Activities Targeted for Assessment	Type of Assessment[12] Planned (what it will consist of)	Performed by[13] (internal or external?)	Number of Assessments Scheduled (at intervals of?)	Findings Reported to?	Corrective Actions (CAs) Anticipated
Field performance and system audits	Sample collection and handling	WAPB program expert	1 per year	Field crew chief	Section C.1.
Contract laboratory performance and system audits	Sample handling; sample analysis, record keeping, preventative maintenance, proficiency testing, staff requirements, and training	Pace program expert	1 per year	Project Manager	Section C.1.

[12]The assessment types may be supervisory surveillance, management systems reviews, readiness reviews, technical systems audits, audits of data quality, or data quality assessments.

[13]Assessors must be independent of the group with interest in the data operation.

C.1 Assessments and Response Actions

Any WAPB technical staff may identify a field or laboratory nonconformity. Once identified, the Project Manager is responsible for corrective action in concert with the pertinent WAPB section chief or QAO. The Project Manager works with the section chief, QAO, or other pertinent staff to document the nonconformity, and then develop and implement corrective actions. Depending on the nonconformity and associated corrective actions, a WAPB section chief or the QAO may need to approve the final corrective action.

For field corrective actions, the field crew chief assigned to the sampling event is responsible for all field decisions, including corrective action. Bring any unusual or unexpected occurrence during data or sample collection to the attention of the crew chief. The crew chief decides what immediate actions to take and what follow up actions, if any, are necessary. The field crew chief has discretion on field corrective actions and documents the action upon return to the office. The section chief assigns a staff member to follow up and document any further required action.

Laboratory corrective actions require each analytical or contract laboratory, conducting analyses for OWQ, to maintain a corrective action program as indicated in the technical specifications of WAPB RFP 21-66919 (IDEM 2021a) or WAPB RFP 22-68153 (IDEM 2021). The laboratory must document any resulting corrective actions taken for problems during the handling, preparation, analysis, or reporting of analytical data to the WAPB. Document corrective actions in the case narrative section of the report for each sample set. Problems, indicating the laboratory QA system may be out of control, trigger a system audit by the QAO or a designee.

Report significant nonconformities to the IDEM Contract Gatekeeper within 14 days, in accordance with the contract. Once identified, the Gatekeeper is responsible for ensuring implementation of the corrective action. If the contractor and the IDEM Gatekeeper cannot come to an agreement on corrective actions or project progress is irreparably harmed, IDEM may refuse payment or conduct other corrective actions through the contract agreement. Several clauses in the state of Indiana contract legal boilerplate language apply and are paraphrased:

- Substantial Performance – The contract is deemed to be substantially performed only when fully performed according to its terms and conditions and any written amendments or supplements.
- Termination for Default – The state may terminate the contract in whole or in part if the contractor fails to:
  - Correct or cure any breach of the contract.
  - Deliver the supplies or perform the services within the time specified in the contract or extension.
  - Make progress endangering performance of the contract.
  - Perform any other contract provisions.
- Waiver of Rights – In part, the contractor shall be liable to the state in accordance with applicable law for all damages to the state caused by the contractor’s negligent performance of any of the services furnished.
- Work Standards – The contractor shall apply the highest professional and technical guidelines and standards. Further, if the state becomes dissatisfied with the work product of or the working relationship with staff assigned to work on the contract, it may request in writing the replacement of any or all such staff.

Finally, in the event any problem is identified with QA or any changes are necessary to the QAPP, make recommendations to the Project Manager and QAM. Communicate any necessary changes to the project team.

C.2 Reports to Management

WAPB QAO submits QA reports, upon completion of the dataset data validation, to the program manager, in this case, the Project Manager. This ensures investigation and correction of problems arising during the sampling and analysis phases of the project. Each report addresses:

- Data assessment and qualification results since the last report.
- Field and laboratory audits performed since the last report.
- Significant QA system and QC task problems.
- Recommended solutions, and status of corrective actions.
- Status of the extent to which project DQOs are satisfied.

Bring problems arising during data assessment and qualification due to any contract laboratory or QA actions to the Project Manager's attention. The Project Manager will work with other staff as necessary to determine whether immediate corrective action is required. Implement laboratory corrective actions according to the respective IDEM RFP and contract requirements.

The QAM, relevant WAPB section chief, Project Manager, any technical staff working on corrective actions, and QA staff receive copies of the progress reports when new developments arise. Store corrective actions progress reports along with the project correspondence in IDEM's Virtual File Cabinet which provides availability to any interested parties.

Assessment reports and any resultant corrective actions will be distributed as set forth in Table 23.

Table 23: Distribution of Assessment Reports and Corrective Actions

Assessment Report Recipient	Why Recipient is Receiving the Assessment Results
Targeted Monitoring or Probabilistic Monitoring Section Chief	Oversight of program
Project Manager	Oversight of program and directly responsible for annual project
QA staff	Oversight of laboratory data

D. Determining Data Usability

Once data packets are returned from the laboratory after the data collection or generation phase of the project, the Chemists in the *OWQ WAPB, Technical and Logistics Section* will perform data review, verification, and validation.

See "Laboratory Data Review For Non-chemists," a helpful manual of reviewing laboratory data packets published by U.S. EPA Region 9 in October 2014.

D.1. Data Verification

Data reduction, validation, and reporting, for both field and laboratory activities, are explained in this section. These activities are performed by field staff for data acquired in the field and by the contract laboratory in compliance with IDEM RFQ, and RFP requirements for the samples analyzed.

Data reduction is the process of converting raw analytical data into final results in proper reporting units. In most instances an equation is used to calculate both field and laboratory results.

Data validation is the process of qualifying analytical and measurement data on the performance of the field and laboratory quality control measures incorporated into the sampling and analysis procedures. Field staff are responsible for validating data acquired in the field. Analytical laboratories are responsible for validating data from samples analyzed in the laboratory. WAPB QA staff review and perform data validation for 100% of the data received from a contract laboratory.

Data reporting is the detailed description of the data deliverables used to completely document the calibration, analysis, quality control measures, and calculations. Data acquired in the field are reported after reduction and validation by the responsible technical staff. Data from laboratory analyses are reported after laboratory reports the data are reviewed, assessed for quality assurance, and the data usability is determined by assigning 1 of 4 Data Quality Assessments (DQAs) Levels to the data.

Data Review

The data review to proceed evaluation (data verification, validation, and assessment) of this project should include review of the items in Table 24.

Table 24: Data Review

Principal Actions, Steps, or Processes to be Reviewed that Could Impact Data Quality	Documents/Forms to Review to Determine Deficiencies or Missing or Incomplete Data
Entering datasheets into AIMS	Field Data Sheet – Attachment 1

Principal Actions, Steps, or Processes to be Reviewed that Could Impact Data Quality	Documents/Forms to Review to Determine Deficiencies or Missing or Incomplete Data
EDI review & import to AIMS per “EDI Import to AIMS II S-004-OWQ-WAP-TL-20-T-R0" and the AIMS User Guide.	MS Access used to export data to a MS Excel spreadsheet for further data validation and use in the QA Review Report.
QA Review of each contract lab report	A MS Word QA review report is created for each lab report. A checklist of items reviewed are provided in each QA report. Deficiencies are communicated with the lab project manager for corrections if possible.

Other data review processes to be used include:

D.2. Data Validation

The data validation process for this data operation will include comparison of the following laboratory results to the data quality indicators established in A.7.

Data validation is the process of qualifying analytical or measurement data on the performance of the field and laboratory QC measures incorporated into the sampling and analysis procedures.

WAPB field staff apply several levels of verification to the project data. Upon field data capture, one staff takes the observation and reads the result aloud to the other staff, who records the data. The recorder then verifies the result is correctly recorded by reading the value aloud back to the observer.

Prior to entering data into AIMS II database a completeness check is run on the field data sheets. The check includes verifying all applicable fields are filled and are legible to both field staff conducting observations. Finally, the data are double-keyed into the AIMS II database from the original field data sheets, then resolving any discrepancies. In addition, data collection in the field is subject to the QC checks described in Section B.5 and the calibration checks described in Section B.7.

Analytical laboratories are responsible for validating data from samples analyzed in the laboratory. WAPB QA staff review laboratory validation results and perform an additional level of data validation for 100% of the data received from a contract laboratory. This independent validation is conducted based on data flags and other QA/QC information obtained from the contract laboratories.

Data reporting is the detailed description of the data deliverables used to completely document the calibration, analysis, QC measures, and calculations. Only report data acquired in the field after the responsible technical staff perform reduction and validation. Data from WAPB contract laboratory analyses are reported after the laboratory reports the data by reviewing, assessing for QA, and

determining the data usability identified by assigning one of four DQA Levels to the data. Section A.9. contains a list of project records and documents.

The data verification process for this data operation will include review of the items in Table 22.

Table 25: Data Verification

Factors or Characteristics used for Verification	Verification Performed Against what Specifications	How Errors are Noted (by notation next to data, in a report, as a lab qualifier, etc.)
Two rounds of QC for datasheet entry into database	100% data transcription accuracy	Errors are corrected in the AIMS database

[1]Additional information covered in the AIMS User Guide (IDEM 2022b) and EDI Import to AIMS II S-004-OWQ-WAP-TL-20-T-R0 (IDEM 2020)

Table 26: Data Verifiers

Staff Assigned to Verify Data	Other Roles they may have had with the Project
Project Manager and other technical WAPB field staff	Sample collection and oversight
WAPB QA staff	Workplan review

D.3. Reconciliation with User Requirements

DQA is the process of determining the scientific and statistical quality of data collected to satisfy the project DQOs. Assess field data and laboratory results for usability regarding each specific project DQO (Section A.7); Section D.1 Data Verification; D.2. Verification and Validation; C.1. Assessments and Response Actions; C.2. Reports to Management; and Section C. on performance and system audits describe the procedures used to produce data and to evaluate the data production system's effectiveness.

D.3.1. Data Quality Assessment

Data Quality Assessment (DQA) is the process of determining the scientific and statistical quality of data collected to satisfy the project data quality objectives. Field data and laboratory results are assessed for usability with regard to each specific project data quality objectives. Section D1 on Data Verification; and Section C1.2 on Performance and System Audits describe the procedures used to produce data and to evaluate the data production system effectiveness.

Chain of Custody: The following items are reviewed to ensure they are complete and acceptable:

- Sampler Signature
- Custodian Signature
- Containers
- Collection Date(s)
- Receiving Time(s)
- Receiving Date(s)
- Preservatives
- Samples received and stored at proper temperatures.

D.3.2. Quality Control (QC) Checks and Compliance:

- Summary Data Package
- Approved Analytical Methods
- Approved Detection and Reporting Limits
- Prep Dates
- Analysis Dates
- Holding Times
- Positive Control (> 0) – *E. coli and Total Coliforms Media Test*
- Negative Control – *E. coli and Total Coliforms Media Test*
- Beginning and Ending Sterility Controls (0) – *E. coli and Total Coliforms Media Test*
- Initial, Continuing, Method, Field, and Trip Blanks (< CRQL, MRL, or Control Limit)
- Field and Method Duplicate RPDs (RPD $\leq$ 20% or $\leq$ Control Limit)
- Matrix Spikes/Duplicate Recoveries ($\leq$ Control Limit)
- Matrix Spikes/Duplicate RPDs (± 20%; RPD $\leq$ 20%)
- Laboratory Control Standards or Laboratory Fortified Blanks ($\pm$ 20%)
- Surrogates (< CRQL or Control Limit)
- Internal Standards (70% to 100%)
- Instrument Calibrations (Correlation Coefficient > 0.995)
- Initial and Continuing Calibration Verification Standards ($\pm$ 10%)
- ICP Interference Check Standards (< CRQL or $\leq$ Control Limit; $\pm$ 20%)
- ICP Serial Dilutions ($\pm$ 10%)
- ICP Linear Range Studies (± 10%)
- ICP Interelement Correction Factors
- Ratio of Dissolved Metals to Total Recoverable Metals (< 1) if applicable
- Ratio of Total Solids to (Total Dissolved Solids + Total Suspended Solids) ($\pm$ 15%) if applicable
- System Performance

The level of Quality Assurance and the Data Quality Assessment (DQA) Level to which the analytical data qualify will be as follows:

D.3.3. Data Verification Report

Laboratory Results for Data Validation Process

In lieu of the data validation table identifying the analytes to be validated and the DQIs used to compare how analyte results aligned with MQOs, as would be done using the data quality objective process, the WAPB Surface Water Monitoring Program uses the following criteria to establish data usability:

Table 27: Data Validators

Staff Assigned to Validate the Data	How they are Independent of the Project
QA Officers	QA Officers do not lead in sampling, or data interpretation activities for a project.

QA staff review and qualify laboratory data by using U.S. EPA CLP guidance for data validation. Data flags consist of two parts, a cause (U, Q, D, B, or H) and an action (R or J). For WAPB projects, assign data qualifiers and flags and enter them into AIMS II. Use flags for both the individual test result and QA/QC Review Reports. Table 29 lists data qualifiers and Table 28 lists data quality flags for analytical results.

Table 28. WAPB Data Flags

Flags	Description
Q	**QC Checks or Criteria.** One or more of the QC checks or criteria are out of control
D	**RPD for Duplicates.** The RPD for a parameter result is outside the acceptable control limits. Consider the parameter an estimate or rejected on the basis listed below: 1) If either the sample or duplicate value is less than the RL and the other value exceeds 5 times the MDL, then the sample result is an estimate. 2) If the RPD is outside the established control limits (max. RPD) but below two times the established control limits (max. RPD), then the sample result is an estimate. 3) If the RPD is twice the established control limits (max. RPD) or greater, then reject the sample result.

Flags	Description
H	**Holding Time.** The performance of the analysis for this parameter is out of the holding time. Estimate or reject the results on the basis listed below: 1) If performance of the analysis is between the holding time limit and 1.5 times the holding time limit, estimate the result. 2) If performance of the analysis is outside 1.5 times the holding time limit, reject the result.
B	**Blank Contamination** This parameter is found in a field or a lab blank. Whether to accept, estimate, or reject the result is based upon the level of contamination listed below: If the result of the sample **is greater than the RL** but **less than five times** the blank contamination, **reject** the result. 1) If **the result of the sample is** between five and ten times **the blank contamination,** estimate **the result**. **2) If the result of the sample is less than the RL or greater than ten times the blank contamination, accept the result**.

Table 29. WAPB Data Qualifiers

Qualifier	Description
R	**Rejected.** Result is not acceptable for use in decision making processes.
J	**Estimated.** The use of the result in decision making processes are determined on a case-by-case basis.
UJ	**Estimated (Between MDL and RL).** The parameter result is above the MDL but below the Laboratory RL and are estimates.

Report data from WAPB contract laboratory analyses after the laboratory reports the data are reviewed, assessed for QA, and the data usability determined and assigned one of four DQA Levels to the data.

DQA Level 1 **Screening Data:** The results are usually generated onsite with no QC checks. This category includes analytical results with no QC checks, precision or accuracy information, or detection limit calculations. Use is primarily onsite data for presurvey and for preliminary rapid assessment.

DQA Level 2 **Field Analysis Data:** Data is recorded in the field or laboratory on calibrated or standardized equipment. Field duplicates are measured on a regular periodic basis. Calculations may be done in the field or later at the office. The category includes analytical

results with limited QC checks. Detection limits and ranges are set for each analysis. The QC checks information for field or laboratory results and are useable for estimating precision, accuracy, and completeness for the project. Data from this category are used independently for rapid assessment and preliminary decisions.

DQA Level 3 **Laboratory Analytical Data:** Analytical results include QC check samples for each batch of samples from which precision, accuracy, and completeness can be determined. Method detection limits (MDLs) have been determined using 40 CFR Part 136 Appendix B. Additionally, all reporting information required in the laboratory contract, and in the Surface Water QAPP, especially Table 6, are included in the analytical data reports. Raw data, chromatograms, spectrograms, and bench sheets are not included as part of the analytical report but are maintained by the contract laboratory for easy retrieval and review upon request from WAPB. Data can be elevated from DQA Level 3 to DQA Level 4 by inclusion of this information in the data report and the QC data are reported using U.S. EPA required CLP forms or CLP format. Data falling under this category are considered as complete, legally defensible, and used for regulatory decisions.

DQA Level 4 **Enforcement Data:** Analytical results mostly meet the CLP data analysis, contract-required quantification limit, and validation procedures. QC data are reported on CLP forms or CLP format. Raw data, chromatograms, spectrograms, and bench sheets are included as part of the analytical report. Additionally, all reporting information required in the laboratory contract, and in the Surface Water QAPP, especially Table 6 in section A.9 are included in the analytical data reports. Data falling under this category are considered as complete, legally quantitative in value, and used for regulatory decisions.

D.3.4. Data Assessment Guidelines

The following references are used by QA staff as guidelines in assessing data quality and usability and in assigning data qualifiers and flags:

“U.S. EPA Region 10: Quality Assurance Data Review Documents.”

“Superfund Analytical Services and Contract Laboratory Program (CLP).”

"U.S. EPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review", U.S. EPA Contract Laboratory Program, EPA-540-R-2016-001, November 2020, Washington DC.

"U.S. EPA Contract Laboratory Program National Functional Guidelines for High Resolution Superfund Methods Data Review", U.S. EPA Contract Laboratory Program, EPA-542-B-16-001, November 2020, Washington DC.

"National Functional Guidelines for Superfund Organic Methods Data Review", U.S. EPA Contract Laboratory Program, "EPA-540-R-2016-002, November 2020, Washington DC.

"USEPA Contract Laboratory Program National Functional Guidelines for Chlorinated Dioxin/Furan Data Review", EPA-540-R-11-016, September 2011, Washington DC.

"Region 5 Standard Operating Procedure for Validation of CLP Inorganic Data," U.S. EPA Region 5, Central Regional Laboratory, 9/93, EPA 905/R-93/010, Washington DC.

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"Using Qualified Data to Document an Observed Release and Background," U.S. EPA, Office of Solid Waste and Emergency Response," draft 10/93.

Assessments and Response Actions

Corrective action is the process of modifying procedures and/or actions in order to remedy out of control deviations from the Quality Assurance Project Plan (QAPP) and bring them back into control. Corrective action is approved by the responsible section chief or project officer and the QAO or designee. Each project section maintains a corrective action file to document corrective actions.

D.3.5. Field Corrective Action

The field crew chief assigned to the sampling event is responsible for all field decisions including corrective action. Any unusual or unexpected occurrence during data or sample collection is brought to the attention of the crew chief who decides the necessary immediate and follow up actions. Field corrective actions are at the discretion of the field crew chief and are documented by the crew chief upon return to the office. The section chief or project officer will assign a staff member to follow up and document any further needed action.

Laboratory Corrective Action

Each analytical or contract laboratory is required to maintain a corrective action program as indicated in the Technical Specifications of IDEM RFQ, RFP or laboratory contract. (See IDEM RFP 22-68153 and RFP 21-66919)**.** The laboratory is required to document any corrective actions taken as a result of problems during the handling, preparation, analysis, or reporting of analytical data to the IDEM, OWQ, WAPB. Corrective actions are documented in the case narrative section of the report for each sample set. Problems that indicate that the laboratory quality assurance system may be out of control will trigger a system audit by the QAO or a designee.

Data Assessment and Qualification Corrective Action

Problems arising during data assessment and qualification which are due to laboratory or QA actions are brought to the attention of the QAO who determines if immediate corrective action is required. The laboratory/quality assurance coordinator assigns a QA staff member to develop, and after approval, implement in-house the corrective action. Laboratory corrective actions are implemented according to IDEM (RFQ, or RFP) and contract requirements.

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F. Attachments

The blank field forms, checklists, and other materials to be used by staff implementing this QAPP include:

- Attachment 1: Field Data Sheet
- Attachment 2: Chain of Custody sheet
- Attachment 3: Sample Analysis Request Form
- Attachment 4: Sample Collection Request Form

F.1. Appendices to the QAPP

Appendix A: Definitions
Appendix B: Menu of Quality Control Samples Types
Appendix C: The IDEM QAPP Report Template

F.2. Attachment 1: Field Data Sheet

Stream Sampling Field Data Sheet

Analysis Set #	EPA Site ID	Rank
		1

Sample #	Site #	Sample Medium	Sample Type	Duplicate Sample #

Stream Name: | River Mile: | County:

Site Description:

Survey Crew Chief	Sample Collectors 1	2	3	4	Sample Collected Date	Time	Hydrolab #	Water Depth/Gage Ht (ft)	Water Flow (cf/sec)	Flow Estimated?	Algae?	Aquatic Life?
										☐	☐	☐

Sample Taken?	Aliquots	Water Flow Type	Water Appearance	Canopy Closed %
◈ Yes ◇ No; Frozen	◈ 1 ◇ 2 ◇ 3 ◇ 4	◇ Riffle ◇ Dry ◇ Stagnant	◇ Clear ◇ Green ◇ Sheen	◇ 0-20% ◇ 60-80%
◇ No; Stream Dry ◇ No; Other	◇ 6 ◇ 8 ◇ 12 ◇ 24	◇ Pool ◇ Run ◇ Flood	◇ Murky ◇ Black ◇ Other	◇ 20-40% ◇ 80-100%
◇ No; Owner refused Access	◇ 48 ◇ 72 ◇ AS-Flow	◇ Glide ◇ Eddy ◇ Other	◇ Brown ◇ Gray (Septic/Sewage)	◇ 40-60%

Special Notes:

Field Data:

Date (m/d/yy)	24-hr Time (hh:mm)	D.O. (mg/l)	pH	Water Temp (°C)	Spec Cond (µohms/cm)	Turbidity (NTU)	% Sat.	Chlorine (mg/l)	Chloride (mg/l)	Chlorophyll (mg/l)	Weather Codes SC	WD	WS	AT
Comments														
Comments														
Comments														
Comments														
Comments														
Comments														
Comments														

Measurement Flags		
	<	< Min. Meter Measurement
	>	> Max. Meter Measurement
	E	Estimated (See Comments)
	R	Rejected (See Comments)

Weather Code Definitions

SC Sky Conditions		WD Wind Direction	WS Wind Strength	AT Air Temp
1 Clear	8 Rain	00 North (0 degrees)	0 Calm	1 < 32
2 Scattered	9 Snow	09 East (90 degrees)	1 Light	2 33-45
3 Partly	10 Sleet	18 South (180 degrees)	2 Mod./Light	3 46-60
4 Cloudy		27 West (270 degrees)	3 Moderate	4 61-75
5 Mist			4 Mod./Strong	5 76-85
6 Fog			5 Strong	6 > 86
7 Shower			6 Gale	

Field Calibrations:

Date (m/d/yy)	Time (hh:mm)	Calibrator Initials	Calibrations Type	Meter #	Value	Units

Calibration Type: pH, DO, Turbidity

Preservatives/Bottle Lots:

Group: Preservative	Preservative Lot #	Bottle Type	Bottle Lot #

Groups: Preservatives		Bottle Types	
GC	General Chemistry: Ice	2000P	2000mL Plastic, Narrow Mouth
Nx	Nutrients: H2SO4	1000P	1000mL Plastic, Narrow Mouth
Metals	Metals: HNO3	500P	500mL Plastic, Narrow Mouth
CN	Cyanide: NaOH	250P	250mL Plastic, Narrow Mouth
O&G	Oil & Grease: H2SO4	1000G	1000mL Glass, Narrow Mouth
Toxics	Toxics: Ice	500G	500mL Glass, Wide Mouth
Ecoli	Bacteriology: Ice	250G	250mL Glass, Wide Mouth
VOA	Volatile Organics: HCl & Thiosulfate	125G	125mL Glass, Wide Mouth
Pest	Pesticides: Ice	40GV	40mL Glass Vial
Phen	Phenols: H2SO4	120PB	120ml Plastic (Bacteria Only)
Sed	Sediment: Ice	1000PF	1000mL Plastic, Corning Filter
Gly	Glyphosate: Thiosulfate	500PF	500mL Plastic, Corning Filter
Hg	Mercury(1631): HCl	60P	60mL Plastic
Cr6	ChromiumVI(1636): NaOH	250T	250mL Teflon
MeHg	Methyl Mercury(1630): HCl	500T	500mL Teflon
		125T	125mL Teflon

Data Entered By: _____ QC1: _____
QC2: _____

3/27/2023 10:36:02 AM Stream Sampling Field Data Sheet

F.3. Attachment 2: Chain of Custody

Indiana Department of Environmental Management

OWQ Chain of Custody Form

Project:
OWQ Analysis Set:

I Certify that the sample(s) listed below was/were collected by me, or in my presence. Date:_____

Signature:_____ Section:_____

Lab Assigned Number	IDEM Control Number	Sample Type	ID	1000 ml P, N.M.	1000 ml G, N.M.	40 ml VIAL	120 ml G (Bact)	500 ml P, N.M.	250 ml P, N.M.	Date and Time Collected	
										Date	Time

P = Plastic	G = Glass	N.M. = Narrow Mouth	Bact = Bacteriological Only	Should samples be iced?	Y	N

Carriers

I certify that I have received the above sample(s).

Signature	Date	Time	Seals Intact		Comments
Relinquished By:			Y	N	
Received By:					
Relinquished By:			Y	N	
Received By:					
Relinquished By:			Y	N	
Received By:					

Lab Custodian

I certify that I have received the above sample(s), which has/have been recorded in the official record book. The same sample(s) will be in the custody of competent laboratory personnel at all times, or locked in a secured area.

Signature:_____ Date:_____ Time:_____

Lab:_____ Address:_____

3/27/2023 10:36:02 AM Chain of Custody Datasheet, Page 1 of 1

F.4. Attachment 3: Sample Analysis Request Form

Indiana Department of Environmental Management
Office of Water Quality
Watershed Planning and Assessment Branch
www.idem.IN.gov

Water Sample Analysis Request PROFILE #284

Project Name: 2023 Probabilistic Monitoring Composite ☐ Grab ☒

OWQ Sample Set	23WQW001	IDEM Sample Nos.	
Crew Chief		Lab Sample Nos.	
Collection Date		Lab Delivery Date	

Anions and Physical Parameters

Parameter	Test Method	Total	Dissolved
Alkalinity (as $CaCO_3$)	SM2320B	☒ **	☐
Total Solids	SM2540B	☒ **	
Suspended Solids	SM2540D	☒ **	
Dissolved Solids	SM2540C		☒ **
Sulfate (as SO_4)	300.0	☐ **	☒ **
Chloride (as Cl)	300.0	☐ **	☒ **
Hardness (Calculated)	SM-2340B	☒ **	☐ **
Fluoride (as F)	SM4500-F-C	☐ **	☐ **

Priority Pollutant Metals Water Parameters

Parameter	Test Method	Total	Dissolved
Antimony (as Sb)	200.8	☒	☒
Arsenic (as As)	200.8	☒	☒
Beryllium (as Be)	200.8	☐	☐
Cadmium (as Cd)	200.8	☒	☒
Chromium (as Cr)	200.8	☒	☒
Copper (as Cu)	200.8	☒	☒
Lead (as Pb)	200.8	☒	☒
Mercury, Low Level	1631, Rev E.	☐	☐
Nickel (as Ni)	200.8	☒	☒
Selenium (as Se)	200.8	☒	☒
Silver (as Ag)	200.8	☒	☒
Thallium (as Tl)	200.8	☐	☐
Zinc (as Zn)	200.8	☒	☒

Cations and Secondary Metals Parameters

Parameter	Test Method	Total	Dissolved
Aluminum (as Al)	200.8	☒	☒
Barium (as Ba)	200.8	☐	☐
Boron (as B)	200.8	☐	☐
Calcium (as Ca)	200.7	☒ ***	☐
Cobalt (as Co)	200.8	☐	☐
Iron (as Fe)	200.7	☐	☐
Magnesium (as Mg)	200.7	☒ ***	☐
Manganese (as Mn)	200.8	☐	☐
Sodium (as Na)	200.7	☐	☐
Silica, Total Reactive (as SiO_2)	200.7	☐	☐
Strontium (as Sr)	200.8	☐	☐

Send reports (Fed. Ex. or UPS) to:
Tim Bowren - IDEM
Bldg. 20, STE 100
2525 North Shadeland Ave.
Indianapolis, IN 46219

Deliver reports to:
Tim Bowren - IDEM
Bldg. 20, STE 100
2525 North Shadeland Ave.
Indianapolis, IN 46219

Organic Water Parameters

Parameter	Test Method	Total
Priority Pollutants: Oranochlorine Pesticides and PCBs	608	☐
Priority Pollutants: VOCs - Purgeable Organics	624	☐
Priority Pollutants: Base/Neutral Extractables	625	☐
Priority Pollutants: Acid Extractables	625	☐
Phenolics, 4AAP	420.4	☐
Oil and Grease, Total	1664A	☐

Nutrient & Organic Water Chemistry Parameters

Parameter	Test Method	Total	Dissolved
Ammonia Nitrogen	350.1	☒	☐
$CBOD_5$	SM5210B	☐	
Total Kjeldahl Nitrogen (TKN)	351.2	☒	☐
Nitrogen, Nitrate + Nitrite as N	353.2	☒	☐
Total Phosphorus	365.1	☒	☐
TOC (Total Organic Carbon)	SM 5310C	☒	
DOC (Dissolved Organic Carbon)	SM 5310C		☒
COD	410.4	☒	☐
Cyanide (Total)	335.4	☐	☐
Cyanide (Free)	SM4500CN-I	☒ *	☐
Cyanide (Amenable)	SM4500CN-G	☒ *	☐
Sulfide, Total	376.2	☐	☐

RFP 22-68153 Contract Number:	58463 (Pace-Indy) PO # 20003041-4 (Pace-Indy)

30 day reporting time required.

Notes:
** = DO NOT RUN PARAMETER IF SAMPLE IDENTIFIED AS A BLANK ON THE CHAIN OF CUSTODY
* = RUN ONLY IF TOTAL CYANIDE IS DETECTED
*** = *Report Calcium, Magnesium components of Total Hardness (Calculated)*

Testing Laboratory: Pace Analytical Services, Inc.
Attn: Olivia Deck
Phone: 317-228-3102 7726 Moller Road
Indianapolis, IN 46268

F.5. Attachment 4: Sample Collection Request Form

SAMPLE COLLECTION REQUEST

IDEM/OWQ

Watershed Assessment & Planning Branch

Sample Set Number | Date 03/14/2022

IDEM Sample Numbers

Crew Chief:

Requested by:

Nos. assigned by: **AIMSII**

Site Information

Facility or Site Name		Facility Permit Number **N/A**	
Street Address	City	County	State **IN**

Requestor Information

Program Area Office Branch Section	☒ ***OWQ/ WAPB***	☐ *Enforcement/ Water Division*
	☐ *OWQ/ Compliance Branch*	☐ *Other*

Sampling Event Information

Sampler Name(s)	Sampler Phone Number.

Reason For Sampling and Goal of Sampling Event (Describe what you want to verify) (Choose one)	☒ **Watershed Monitoring Program** ☐ Fixed Station Monitoring Program ☐ NPDES Compliance ☐ Special Project	☐ TMDL Project ☐ Lakes Project ☐ Fish Consumption Advisory ☐ Watershed Characterization
Purpose of Sampling DQO level (Choose one) (i.e. enforcement, screening, etc.)	☐ 1. Screening, no QC checks. ☐ 2. Field/Lab, estimated precision and accuracy.	☒ 3. **Laboratory, precision and accuracy, no raw data.** ☐ 4. CLP data package
Parameters (Choose all that apply)	☒ Metals ☒ Cyanide ☒ Dissolved trace metals ☒ General water quality ☒ Nutrients ☐ $CBOD_5$	☐ Volatile organics ☐ Semi-volatile organics ☐ Pesticides ☐ Bacteria – *E. coli*
Matrices to be sampled (Choose all that apply)	☒ **Water** ☐ Sediment, sludge, soil	☐ Fish/ biological
Projected Sampling Date(s)	Estimated lab arrival date	Transport means ☒ **Staff** ☐ UPS/ Fed. Ex/ Bus

Laboratory Information

Name: Pace Analytical Services	Turnaround time	Number of Samples	Estimated cost
PO Number: SCM #58483 (Pace-Indy) PO #20003041-4 (Pace-Indy)	**30 Days**		$ @ Ea.

Authorizing Signatures

All: Gatekeeper _____ Section Chief _____ OMBA _____	$25,001 up: Assistant Commissioner OWQ _____
	$40,000 up: Deputy Commissioner, OMBA
$15,001 up: Branch Chief	

Questions: Call Tim Bowren, 308-3181

6ce01.c tlb 03-14-2022

F.6. Appendix A: Definitions

The following are definitions IDEM, OWQ utilizes in interpretation of terminology referenced in IDEM QAPPs, Sampling and Analysis Workplans, and Request for Proposals. Contractors must use the IDEM Definition column when referring to the item listed.

Cross Ref represents typical industry acronyms or terms.

Definitions

IDEM Definition	Cross Ref	Type	Description
% Solids			Total percent solids as determined in a 103-105 °C oven.
Ambient Water			Waters in the natural environment (e.g., rivers, lakes, streams, and other receiving waters), as opposed to effluent discharges.
Accuracy			Accuracy is the degree to which an observed value and an accepted reference value agree. Percent recovery (%R) of reference standards is calculated as indicated below: $\%R = \frac{(A - B) \times 100}{C}$ where: A = Analyte concentration determined experimentally with known quantity of reference material added. B = Background determined by separate (unspiked) analysis of sample, or in the field, a blank. C = True value of reference standard added.
Analytical Shift			All of the 12-hour period during which analyses are performed. The period begins with the analysis of the LFB and ends exactly 12 hours later. All analyses both started and completed within this 12-hour period are valid.

Definitions

IDEM Definition	Cross Ref	Type	Description
ASTM Type 1		Reagent Water	Water demonstrated to be free from the analyte(s) of interest and potentially interfering substances at the MDL for an analyte in the referenced method. Type I reagent water has a minimum resistivity of 10 megohms-cm, @ 25°C (in-line).
Batch			A group of samples extracted, digested, diluted, or treated and analyzed at the same time and in the same manner. Refer to the relevant method for defining the size of a batch. When no batch size is specified, a batch is comprised of 10 or less samples. Reagents, reagent water and solid phase disks or cartridges (SP's), used for sample prep, internal standards, spike solutions, surrogates, etc., must be prepared or drawn from the same source or lot. A new batch must be started with any change in lot or solution. If a solution of reagents, e.g., fortification solution or CCC solution, is changed, a new batch must be created, even if the individual lot numbers of reagents, in the new solution, are the same as used in the old solution. If reagent water is exhausted before reaching the limit of a batch, a new batch must be created. If a new lot of SPs are used, a new batch must be created.
BOD			Biochemical Oxygen Demand.
BTU			British Thermal Unit.
Bubbler Blank			The process of analyzing water in the bubbler, including purging Hg from the water, trapping the Hg purged on a sample trap, desorbing the Hg onto an analytical trap, desorbing the Hg from the analytical trap, and determining the amount of Hg present. The blank is somewhat different between days, and the average of a minimum of the results from three bubbler blanks must be subtracted from all standards and samples before reporting the results for these standards and samples.

Definitions

IDEM Definition	Cross Ref	Type	Description
CAL		Calibration Standard	A solution prepared from the dilution of stock standard solutions. The CAL solutions are used to calibrate the instrument response with respect to analyte concentration.
Case			A case consists of a finite number of samples collected over a given time period from a particular site. This is also referred to as a sample set.
CB		Calibration Blank	A volume of ASTM type I water or reagent water fortified with the same matrix as the calibrations standards, but without the analytes, internal standards, or surrogate analytes. The calibration blank is a zero standard and is used to define the baseline of the instrument.
CCC		Continuing Calibration Check	Used to demonstrate acceptable initial calibration and confirm continued acceptable analytical performance. The CCC is ran immediately after initial calibration, recalibration and periodically throughout an analysis. With methods that utilize procedural standards (see PSC), analysis of the LFB may be used as a CCC, unless prohibited by the method.
CCC	CCV	Continuing Calibration Verification	See Continuing Calibration Check (CCC).
CF			Calibration Factor.
COD			Chemical Oxygen Demand.

Definitions

IDEM Definition	Cross Ref	Type	Description
Completeness			Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained for that measurement. The percent completeness for the project is stated for both field and laboratory analyses as follows: % Completeness = (number of valid measurements) x 100 (number of measurements planned) where: "valid measurements" refers to numbers of investigational samples obtained or to be obtained for a specific purpose, or in order to satisfy a particular project objective.
CRQL			Contract Required Quantitation Limits. CRQLs listed are the higher values of laboratory reported MDL= s or method MDL= s times a factor of 3.18 as recommended in USEPA wastewater compliance guidance. Typically the resulting values are rounded to number nearest to (1, 2, or 5) x 10^n, where n is an integer. CRQLs are equivalent to PQLs, MLs, RLs, or Method Reporting Limits (MRLs) in various methods and EPA guidance documentation.
D001			Ignitability - as defined in 40 CFR 261.21 and SW-846.
D002			Corrosivity - as defined in 40 CFR 261.22 and SW-846.
D003			Reactivity - as defined in 40 CFR 261.23 and SW-846.

Definitions

IDEM Definition	Cross Ref	Type	Description
Data reduction			The process of converting raw analytical data into final results in proper reporting units. In most instances an equation is used to calculate both field and laboratory results.
Dissolved			The concentration of analyte that will pass through a 0.45 µm membrane filter assembly, prior to sample acidification.
DQA		Data Quality Assessment	Quality Assurance/Control assessment level specified in Section 2. Dictates QA/QC and reporting requirements.
Duplicate			One sample split into two laboratory samples and analyzed separately with identical procedures.
Elutriate			To purify, separate, or remove lighter or finer particles by washing, decanting, and settling.
EDD			Electronic Data Deliverable – Electronic file(s) created by a contractor for transmitting and reporting analytical data. Transmission specifications vary by OWQ group.
EDI			Electronic Data Import – Format Specification developed by IDEM WAPB for import of lab data and lab QC to the AIMS database.
EPTOX15			Extraction Procedure Toxicity with Organics - as defined in 40 CFR 261.24 and SW-846, including nickel.

Definitions

IDEM Definition	Cross Ref	Type	Description
Equipment Blank			An aliquot of reagent water that is subjected in the lab or field to all aspects sample collection and analysis, including contact with all sampling devices and apparatus for sample collection have been adequately cleaned before shipment to the field site. An acceptable equipment blank must be achieved before the sampling devices and apparatus are used for sample collection. In addition, equipment blanks should be run on random, representative sets of gloves, storage bags, and plastic wrap for each lot to determine if these materials are free from contamination before use.
Extractor			The extractor used for the Extraction Procedure Toxicity test must be equivalent to those shown in Figures 103, Method 1310 of SW-846.
FD1 and FD2		Field Duplicates	Two separate samples collected at the same time and place under identical circumstances and treated exactly the same throughout field and laboratory procedures. Analyses of FD1 and FD2 give a measure of the precision associated with sample collection, preservation, and storage, as well as with laboratory procedure.
FIA			Flow Injection Analyzer.
Field Blank			Quality control blanks prepared on-site during sampling by pouring analyte-free water into appropriate sample containers for each analyte group of interest. Field blanks are chemically preserved, stored, transported and analyzed with the collected field samples.

Definitions

IDEM Definition	Cross Ref	Type	Description
FRB		Field Reagent Blank	An aliquot of reagent water or other blank matrix that is placed in a sample container in the laboratory and treated as a sample in all respects, including shipment to the sampling site, exposure to sampling site conditions, storage, preservation, and all analytical procedures. The purpose of the FRB is to determine if method analytes or other interferences are present in the field environment.
FRB	TB	Trip Blank	See Field Reagent Blank (FRB).
GC			Gas Chromatography
GC/MS			Gas Chromatography/Mass Spectroscopy
Geometric site			Sampling site chosen according to its drainage area within a watershed.
Holding Time			The holding time for a sample starts at the time a grab sample is collected or when the last grab sample component of a composite sample is collected during a collection event. Holding time ends when either the sample is prepared for an analysis (if applicable) or is analyzed for a parameter. In addition, the maximum time between a sample preparation step (such as a distillation or extraction) and the analysis step may be specified in the test method(s).
HPLC			High Pressure Liquid Chromatography
IC		Initial Calibration	Instrument Calibration performed using a series of calibration standards in accordance with method specifications. Instrument should be operational in accordance with manufacturer=s specifications and any additional tuning or performance checks must be completed and verified. Calibration curves used for subsequent analyses are generated.

Definitions

IDEM Definition	Cross Ref	Type	Description
IC			Ion Chromatography
ICP			Inductively Coupled Plasma
ICP-MS			Inductively Coupled Plasma Mass Spectroscopy
IDL		Instrumental Detection Limit	The concentration equivalent to the analyte signal which is equal to three times the standard deviation of a series of ten replicate measurements of a reagent blank signal at the same wavelength.
Intercomparison Study			An exercise in which samples are prepared and split by a reference laboratory, then analyzed by one or more testing laboratories and the reference laboratory. The intercomparison, with a reputable laboratory as the reference laboratory, serves as the best test of the precision and accuracy of the analyses at natural environmental levels.
IPR		Initial Precision & Recovery	Four aliquots of the ongoing precision and recovery standard analyzed to establish the ability to generate acceptable precision and accuracy. IPRs are performed before a method is used for the first time and any time the method or instrumentation is modified.
IR			Infrared Spectroscopy
IS		Internal Standard	A pure analyte(s) added to a sample, extract, or standard solution in known amount(s) and used to measure the relative responses of other method analytes and surrogates that are components of the same sample or solution. The internal standard must be an analyte that is not a sample component.

Definitions

IDEM Definition	Cross Ref	Type	Description
LCS		Laboratory Control Standard	A standard usually certified by an outside agency that is used to measure the bias in a procedure. For certain constituents and matrices, use National Institute of Standards and Technology (NIST) or other national or international traceable sources (Standard Reference Materials), when available.
LD1 and LD2		Laboratory Duplicates	Two aliquots of the same sample taken in the laboratory from the same sample bottle and analyzed separately using the referenced method. Analyses of LD1 and LD2 indicate precision associated with laboratory procedures, but not with sample collection, preservation, transportation, or storage procedures.
LDR	LCR	Linear Calibration Range	See Linear Dynamic Range
LDR		Linear Dynamic Range	The concentration range over which the analytical curve remains linear.
Leachate			EP Toxicity, except with no addition of acetic acid. Specifications listed in 329 IAC 2, February 1, 1989.
LFB	OPR	Ongoing Precision & Recovery Standard	See Laboratory Fortified Blank (LFB).
LFB	LCS	Laboratory Control Sample	See Laboratory Fortified Blank (LFB).

Definitions

IDEM Definition	Cross Ref	Type	Description
LFB		Laboratory Fortified Blank	An aliquot of reagent water or other blank matrix to which known quantities of the method analytes are added in the laboratory. The LFB is analyzed exactly like a sample. Its purpose is to determine whether the methodology is in control and to assure that the results produced by the laboratory remain within the limits specified in the referenced methods for precision and accuracy.
LFM	MS and MSD	Laboratory Fortified Sample Matrix	An aliquot of an environmental sample to which known quantities of the method analytes are added in the laboratory. The LFM is analyzed exactly like a sample, and its purpose is to determine whether the sample matrix contributes bias to the analytical results. The background concentrations of the analytes in the sample matrix must be determined in a separate aliquot and the measured values in the LFM corrected for the concentrations found.
LLD	LOD	Lower Level of detection	[also called detection level and level of detection (LOD)]—the constituent concentration in reagent water that produces a signal 2(1.645)s above the mean of blank analyses (where s is the estimate of standard deviation). This establishes both Type I and Type II errors at 5%.
LPC		Laboratory Performance Check Solution	A solution of one or more compounds (analytes, surrogates, internal standard, or other test compounds) used to evaluate the performance of the instrument system with respect to a defined set of method criteria.
LPC	IPC	Instrument Performance Check Solution	See Laboratory Performance Check Solution (LPC).
LRB	MB	Method Blank	See Laboratory Reagent Blank (LRB).

Definitions

IDEM Definition	Cross Ref	Type	Description
LRB		Laboratory Reagent Blank	An aliquot of reagent water that is treated exactly as a sample including exposure to all glassware, equipment, reagents, and acids that are used with other samples. The LRB is used to determine if method analytes or other interferences are present in the laboratory environment, the reagents or apparatus.
LRB	PB	Preparation Blank	See Laboratory Reagent Blank (LRB).
Maximum Holding Time			The maximum time a sample may be stored before analysis.
May Not			This action, activity, or procedural step is prohibited.
May			This action, activity, or procedural step is optional.
MDL		Method Detection Limit	The minimum concentration of an analyte that can be identified, measured and reported with 99% confidence that the analyte concentration is greater than zero. For seven replicates of the sample, the mean must be 3.14*s* above the blank result (where *s* is the standard deviation of the seven replicates). Compute MDL from replicate measurements of samples spiked with analyte at concentrations more than one to five times the estimated MDL. The MDL will be larger than the LLD because typically 7 or less replicates are used. Additionally, the MDL will vary with matrix. MDL's must be determined in accordance with 40 CFR, Part 136, Appendix B.

Definitions

IDEM Definition	Cross Ref	Type	Description
ML		Minimum Level	The lowest level at which the entire analytical system gives a recognizable signal and acceptable calibration point.
MRL	CRQL	Method Reporting Limit	MRLs listed are the higher values of laboratory reported MDL= s or method MDL= s times a factor of 3.18 as recommended in USEPA wastewater compliance guidance. Typically, the resulting values are rounded to number nearest to (1, 2, or 5) x 10^n, where n is an integer. Method Reporting Limits (MRLs) are equivalent to PQLs, MLs, RLs, or in various methods and EPA guidance documentation. This defined concentration is no lower than the concentration of the lowest calibration standard for that analyte and can only be used if acceptable QC criteria for this standard are met.
MS and MSD	LFM	Matrix Spike & Matrix Spike Duplicate	Aliquots of an environmental sample to which known quantities of the analytes are added in the laboratory. The MS and MSD are analyzed exactly like a sample. Their purpose is to quantify the bias and precision caused by the sample matrix. The background concentrations of the analytes in the sample matrix must be determined in a separate aliquot and the measured values in the MS and MSD corrected for background concentrations.
MS			Matrix Spike.
MSA		Method of Standard Addition	The standard addition technique involves the use of the unknown and the unknown plus a known amount of standard. Method of Standard Additions as described in EPA 600/4-79-020

Definitions

IDEM Definition	Cross Ref	Type	Description
Must			This action, activity, or procedural step is required.
Neutral			The leaching method extraction as specified for
One (1) minute kick sample			A stationary method of sampling that is accomplished using a box-shaped net comprised of canvas bottom and/or sides and 504µm nylon mesh back. The designated area is sampled for one minute.
Out-of-Control			A condition which exists when a single analytical or instrumental evaluation measure fails to meet the criteria specified an analytical method, IDEM/OWQ contract, or instrument manufacturer's specification.
OWQ			Office of Water Quality.
OWQ Analysis Set			See Case
PCB			Polychlorinated Biphenyls.
PDS		Primary Dilution Standard Solution	A solution of several analytes prepared in the laboratory from stock standard solutions and diluted as needed to prepare calibration solutions and other needed analyte solutions.
Petroleum			Identification of petroleum fuel contamination Analysis -(gasoline, kerosene, diesel) using Gas Chromatography with a flame Ionization Detector, or using Gas Chromatography with a Photoionization Detector as per IDEM requests. Also, analysis of heavy oils using an Infrared Spectrophotometer.
Plasma Solution			A solution that is used to determine the optimum height above the work coil for viewing the plasma.
Pour Point			The outlet of a subwatershed or the common point where all the water flows out of any given subwatershed.

Definitions

IDEM Definition	Cross Ref	Type	Description
PQL	CRQL	Practical Quantitation Limit	See Contract Required Quantitation Limit (CRQL)
ppb			Parts per Billion
ppm			Parts per Million
PSC		Procedural Standard Calibration	A calibration method where calibration standards are prepared and processed (e.g., purged, extracted, and/or derivatized) in exactly the same manner as a sample. All steps in the process from addition of sampling preservatives through instrumental analyses are included in the calibration. Using procedural standard calibration compensates for any inefficiencies in the processing procedures.
QA			Quality Assurance - A definitive plan for laboratory operations that specifies the measures used to produce data with known precision and bias.
QAO			Quality Assurance Officer. The person responsible for all QA/QC and technical aspects of the contract. He/she manages all aspects of the laboratory program, including sampling.
QC			Quality Control - A set of measures used during an analytical method to ensure that the process is within specified control parameters.
QCS		Quality Control Sample	A solution of method analytes of known concentrations which is used to fortify an aliquot of LRB matrix. The QCS is obtained from a source external to the laboratory and different from the source of calibration standards. It is used to check laboratory performance with test materials prepared external to the normal preparation process.

Definitions

IDEM Definition	Cross Ref	Type	Description
RPD		Relative Percent Difference	The RPD is a measure of precision and the degree to which two or more measurements are in agreement. Relative percent difference (RPD) is calculated for each pair of duplicates as indicated below: $RPD = \frac{|(S - D)| \times 100}{(S + D) / 2}$ where: S = First sample value (original or matrix spike value) D = Second sample value (duplicate or matrix spike duplicate value)
Replicate			A repeated operation during an analytical procedure. Two or more analyses for the same constituent in an extract of one sample constitute replicate extract analyses.
RF			Response Factor.

Definitions

IDEM Definition	Cross Ref	Type	Description
RL			Reporting level — the lowest quantified level within an analytical method's operational range deemed reliable enough, and therefore appropriate, for reporting by the laboratory. RLs may be established by regulatory mandate or client specifications, or arbitrarily chosen based on a preferred level of acceptable reliability. Examples of RLs typically used (besides the MDL) include: Level Of Quantitation (LOQ) Minimum Quantifiable Level (MQL) Minimum Reporting Level (MRL)
RRF			Relative Response Factor
S.C.			Specific Conductance.
SA	SS	Surrogate Analyte	A pure analyte(s), which is extremely unlikely to be found in any sample, and which is added to a sample aliquot in known amount(s) before extraction or other processing and is measured with the same procedures used to measure other sample components. The purpose of the SA is to monitor method performance with each sample.
Sample Set			See Case
SAS			Special Analytical Services - Non-routine analyses listed under Task SAS

Definitions

IDEM Definition	Cross Ref	Type	Description
Should			This action, activity, or procedural step is suggested but not required.
SIC		Special Interference Check Solution	A solution of selected method analytes of higher level concentrations which is used to evaluate the procedural routine for correcting known interelement spectral interferences with respect to a defined set of method criteria.
SPCC			System Performance Check Compound
Specificity			The qualitative measure of degree of separation of an analyte from other analytes and the sensitivity of the response of an analyte to an analytical procedure. A procedure with a high degree of specificity for an analyte would be able to resolve the analyte in a complex mixture and provide a sufficient detector response to quantify the analyte.
SSS		Stock Standard Solution	A solution containing an analyte that is prepared using a reference material traceable to EPA, the National Institute of Science and Technology (NIST), or a source that will attest to the purity and authenticity of the reference material.
SVOA			Semi-volatile Organics Analysis (Tasks 6). Compounds amenable to analysis by extraction with solvent. Used synonymously with Base/Neutral/Acid (BNA) compounds.
SW-846			"Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods", SW-846, Third Edition Nov. 1986, and any subsequent updates or amendments.
Targeted site			A sampling site intentionally selected based on specific monitoring objectives or decisions to be made.

Definitions

IDEM Definition	Cross Ref	Type	Description
TCLP			Toxicity Characteristic Leachate Procedure - as defined in the Federal Register, Vol 55, No. 61, Thursday, March 29, 1990.
TKN			Total Kjeldahl Nitrogen.
TOC			Total Organic Carbon.
Total Coliforms			Total coliforms is a term used to measure the amount of coliform bacteria in drinking water and other substances consumed by humans. Coliforms are a large class of micro-organisms that are found in human and animal fecal matter and are used to determine whether the drinking water or other substance may have other disease-causing organisms in it. Water with a high total coliform level has a high probability of contamination by protozoa, viruses and bacteria that may be pathogenic.
Total Metals			Metals determined on an acid extracted sample as (OWQ per "Methods for Chemical Analysis of Water and Methods) -Wastes", EPA-600 4-79-020.
TOX			Total Organic Halide.
TPL			Target Parameter List.
Trip Blank			Trip blanks are only used for VOC samples. Blanks of VOC-free water are prepared by the organization providing sample containers for VOC collection. These blanks are transported to the site with the empty VOC sample containers and shipped to the analyzing laboratory in the same transport containers as the VOC samples. They remain unopened for the entire trip and are analyzed at the laboratory with the environmental VOC samples.

Definitions

IDEM Definition	Cross Ref	Type	Description
TRM		Total Recoverable Metals	The concentration of an analyte determined in an unfiltered sample following treatment by refluxing with hot, dilute mineral acid.
Tuning Solution			A solution which is used to determine acceptable instrument performance prior to calibration and sample analyses
Type I error	alpha error		The probability of determining that a constituent is present when it actually is absent.
Type II error	beta error		The probability of not detecting a constituent that actually is present.
Ultraclean Handling			A series of established procedures designed to ensure that samples are not contaminated during sample collection, storage, or analysis.
VOA			Volatile Organics Analysis
VOC			Volatile Organic Compounds

F.7. Appendix B: Menu of Quality Control Samples Types

This table of quality control (QC) sample types (per B.5.) was published in October 2014, in the U.S. EPA Region 9 manual. "Laboratory Data Review For Non-chemists".

Blank Contamination				
TYPE	**DEFINITION**	**FREQUENCY**	**PURPOSE**	**CORRECTIVE ACTION(s) to consider**
Equipment or Rinsate Blank	A sample created by rinsing sampling equipment after it has been cleaned.	Usually 1:10 or each day	Help identify contamination due to decontamination procedures, ambient field conditions, storage conditions, or lab problems.	Discount (do not correct) positives; fix decon procedures; check method blank; check w/lab; possible resample.
Field Blank	Field Blank Sample created by adding distilled or deionized water to a container in field. Used when using dedicated or disposable equipment.	Usually 1:10 or each day	Help identify contamination due to ambient field conditions, bottles/storage conditions, or laboratory problems.	Discount (but don't correct) positives, check bottles, check method blank; check w/lab; possible resample.
Trip Blank	Volatile free water placed in VOA vial by lab and sent to field with bottles.	One per shipping container	Identify contamination from transit, bottles, or laboratory conditions.	Re-evaluate shipping protocols, check method blank; check w/lab.
Reagent Blank	Sample generated by laboratory to demonstrate reagents are free of contamination.	Whenever new batch of reagents received; not all labs run, few report to clients.	Identify contamination in common chemicals used in laboratory.	Laboratory should take action with suppliers; reagents should not be used.
Laboratory or Method Blank	Sample generated by laboratory and introduced at beginning of sample processing	1:batch or 1:20 samples	Identify contamination introduced within laboratory.	Discount (but do not correct) positives; check w/lab; redo analysis; resample.
Temperature Blank	A VOA vial containing clean water generated by laboratory and sent to field with bottles.	1 per cooler	Used by the laboratory to check the temperature of the samples upon arrival at the laboratory.	Sample results may be biased low due to losses. Non-detects may be false negative. Note in narrative.

Sensitivity (detection limits)				
TYPE	**DEFINITION**	**FREQUENCY**	**PURPOSE**	**CORRECTIVE ACTION(s) to consider**
Detection Limit (MDL)	Determines lowest concentration of an analyte a laboratory can detect.	Usually once a year.	Used to establish the lowest limit of reliable instrument measurement.	Compare MDL to action levels or regulatory standard to ensure will be able to make required decisions. Consider alternative methods or lab if unable to reach objectives.
Quantitation Limit (QL) (Often used interchangeably with Reporting Limit (RL) and Practical Quantitation Limit (PQL))	MDL "bumped" up to a level where lab feels confident all positives are real. Usually a factor of 2 to 10 times MDL. For a PQL, factor is 5 to 10.	Calculated value after MDL study.	Ensures that the laboratory is reporting only analytes it detects with confidence.	Compare QL to action levels or regulatory standard to ensure will be able to make required decisions. Consider alternative methods or laboratory if unable to reach objectives. Consider having laboratory report at MDL level for some or all analytes.

Accuracy (spike performance samples)

TYPE	DEFINITION	FREQUENCY	PURPOSE	CORRECTIVE ACTION(s) to consider
Field Matrix Spike	Known amounts of representative compounds are added to samples in field. Sample submitted blind. This is effectively a PE sample. Uncommon QC sample.	If run, once per sampling event.	Test laboratory performance and ability to obtain correct results.	Check w/lab to assess whether can perform method, look at other QC (lab MS, LCS).
Laboratory Matrix Spike (MS)	Known amounts of an analyte or representative compounds are added to sample(s) in laboratory.	1:20 or 1:batch	Identify whether lab has performed method properly or if sample matrix is introducing a positive or negative bias.	Check w/lab; determine whether result due to matrix problem or lab problem (look at LCS results, if OK = matrix; see whether a 2nd sample was prepared and run, if 2nd result out = matrix problem, if in = lab problem). Determine if spiked sample representative of all samples.
Laboratory Control Sample (LCS) aka: Blank Spike or Laboratory Fortified Blank	Known amounts of an analyte or representative compounds are added to a "clean" matrix (lab water or clean sand) in laboratory.	1:20 or 1:batch	Identify whether lab has performed method properly.	Request lab reanalyze all samples in batch associated with LCS if haven't already; possible resample at lab cost; use results w/caution
Instrument Spike	Known amounts of an analyte or representative compounds are injected directly in instrument.	As needed when contamination suspected.	Determine losses of material due to instrument.	Nothing. Typically not reported to client.
Post Digestion Spike	Metals spike made after digestion procedure. Used in method of standard additions to correct for matrix effects.	Usually as needed.	Permits calculation of results for metals although a matrix effect exists.	Not a QC sample per se, used for quantitation.
Surrogate Spike.	Known amounts of organic compounds, similar in behavior to target analytes, are added to samples before processing.	In every sample.	Mimic behavior of target compounds. Used to identify either matrix or extraction problems.	If all surrogates out, require re-extraction. If some out, look at similarities to targets. Re-extraction is possible option. If sample all gone, may need to resample.
Single Blind Performance Evaluation (PE) Sample	Known amounts of an analyte or organic compounds provided to lab in a labeled vial or bottle.	Once a quarter, once a sample shipment, or not at all.	Depends on a number of factors. Check laboratory's ability to perform analysis under optimum conditions.	Lab should pass when it knows it is being tested. Consider suspension of work if doesn't pass. At minimum, lab should demonstrate how it will address problem.
Double Blind Performance Evaluation (PE) Sample	Known amounts of an analyte or organic compounds are provided to lab, but are introduced with samples so lab is not aware of presence.	Once a quarter, once a sample shipment, or not at all.	Depends on a number of factors. Check laboratory's ability to perform analysis without it's knowing it is being tested.	Consider suspension of work for that analysis if lab doesn't pass. At minimum, lab should demonstrate how it will address problem.

Precision (Replicates)

TYPE	DEFINITION	FREQUENCY	PURPOSE	CORRECTIVE ACTION(s) to consider
Co-Located Sample	Second sample collected at same location but different time (water, air) or at a nearby location (soil, sediment). Sent blind to laboratory.	Usually 1:10, may not collect if collecting replicates.	Determine heterogeneity of matrix, reproducibility of sample technique and laboratory performance.	Expand number of samples or area sampled in future events or resample. Check laboratory duplicates or matrix spike duplicates to make sure looking at field variability, not laboratory.
Field Replicate (duplicate)	A sample divided into two or more homogeneous parts.	1:10	Determine reproducibility of subsampling technique and laboratory/method performance.	Check laboratory duplicates or matrix spike duplicates to make sure looking at field variability, not lab. Check field sampling procedures. In extreme cases, resample.
Matrix Spike Duplicate (MSD)	A known amounts of an analyte or representative compounds are added in the laboratory to a second aliquot of the sample used for matrix spike.	1:20 or 1:batch	Determine laboratory reproducibility or precision. MSD is used because many samples do not contain organic compounds so no results are available on which to do precision calculations.	Check LCSD results. View results with caution and be sensitive to upper and lower range of concentrations. Check whether your sample was used for QC If samples were batched, although using another client's sample is not as critical as in MS.
Laboratory Control Sample Duplicate (LCSD)	Known amounts of an analyte or representative compounds are added to a second "clean" matrix (lab water or clean sand) in laboratory. Duplicate of LCS.	1:20 or 1:batch	Determine laboratory precision without matrix effects.	Reanalysis of all samples in batch. Resample at lab cost.
Laboratory Duplicate	Second processing and analysis of sample. Usually for general chemistry or metals analyses.	1:20 or 1:batch	Determine laboratory precision.	Check w/lab. Check LCSD results (may not be available for inorganics).View results with caution and be sensitive to upper and lower range of concentrations. Check whether your sample was used for QC if samples were batched, although using another client's sample is not as critical as in MS.
Field Split	A field replicate/duplicate that is sent to a second laboratory.	Seldom, usually only if problems develop in previous work.	Used as a check on laboratories.	Check laboratory QC results. Consider PE samples to determine which lab accurate and should be kept.
Laboratory Split	A laboratory created replicate/duplicate that is sent to a second laboratory.	Seldom, mainly when problem suspected.	Determine interlaboratory precision. Independent assessment of laboratory problems at the primary lab.	Check laboratory QC results. Consider PE samples to determine which lab accurate and should be kept.

F.8. Appendix C: IDEM QAPP Report Template (Per A.9. and B.10.)

	**QAPP Report on the completion of the** *(Enter QAPP Title as it appeared on the approved QAPP or WP)* **Quality Assurance Project Plan (QAPP)** **Document #:** *(Enter IDEM QA provided QAPP or Work Plan ID#)* **Location:** *where data operation took place* **Date Completed:** *(Enter date on which implementation of the specific data operations (QAPP) was completed)*

The information in this report is intended to accompany or otherwise help to track any data generated by the QAPP reported upon herein. This report is meant to enable easier access to, and recovery of the metadata and other resource information associated with that QAPP, and its implementation and conclusions. A copy of this report also will be maintained in a dedicated "QAPP Reports Folder" within the IDEM QAPP library to facilitate that access.

IDEM recommends that each program area performing a data operation (activity to generate or use environmental data for decision making, modelling, or the development and implementation of environmental technology) should please maintain a copy of the QAPP, and the records and documents generated during that operation in a manner that facilitates easy retrieval for review or evaluation by future IDEM staff, scientific peers, and others interested in the performance of, and/or the results from that data operation. (As with the QAPP template, please delete all similar red, Arial italic text used to provide instructions for this QAPP Report template.) Provide the following:

Source name and ID number of any U.S. EPA or other federally funded grant associated with this QAPP:

IDEM Office, Branch, and Section originating this QAPP:

QAPP Summary:
Please insert here the language from the QAPP summary that appears just after the signature page in the QAPP.

Contract Information:
Under which third parties are contracted to assist with implementation of this QAPP. Provide to the extent possible the 1) name or title, 2) tracking and/or identification number(s), and the 3) effective period of any applicable contract(s) or contract requirements document(s) (meaning; a contract, Executive Document Summary (EDS), request for proposal (RFP), request for quote (RFQ), memorandum of understanding (MOU), purchase order (PO), scope of work (SOW) or other document) describing

supply, analytical service, quality assurance/quality control, and raw and/or processed data deliverables due the contracting IDEM program under an authorized payment-for-service arrangement.

In addition clarify where such document(s) may be accessed for viewing, either as an electronic hyperlink to that documentation, or as an attachment provided to the IDEM QA staff for management with this report. It is important that this information is included because these contract related documents always contain the QA/QC requirements to be met by the laboratories and should match that described by the QAPP.

Date QAPP was approved for implementation:

Date QAPP data operations activities were completed:

QAPP Lead Investigator:

A copy of the version(s) of the QAPP used to generate the accompanying data can be obtained by contacting IDEM staff responsible for operating the IDEM quality assurance library.

Please complete the table below using the information already provided in section A.9. and B.10. of this QAPP template, except that any changes to the original plan for document management recorded in Table 9 of the QAPP, should be updated herein. Note that some Record Types may not be relevant to the QAPP implemented.

Record Type	Where Records are Stored (name of database, directory, or storage drive [e.g., IDEM Virtual File Cabinet or program specific drive])	Document Title	Indexing Reference (pathway to the data/where to find the data)	Retention Periods
The Subject QAPP:				
Associated documents:				
Records of field assessments:				
Field logs				
Calibration records				
Chain of custody forms				
Lab records, raw data, and bench notes				

Record Type	Where Records are Stored (name of database, directory, or storage drive [e.g., IDEM Virtual File Cabinet or program specific drive])	Document Title	Indexing Reference (pathway to the data/where to find the data)	Retention Periods
Data verification and validation records				
Data assessment records				
Other				
Modeling results				

Note: A number of these record types may require the same information for each QAPP or QAPP-based work plan documented, assuming that within each specific program all field logs, or all chain of custody receipts, or all laboratory packets are stored in the same location. This will facilitate completion of the table by the project manager completing the QAPP report, while still easing the search burden for future, or even outside data users Regarding records retention periods*, the Indiana Archive and Records Administration (IARA) of maintains an Internet page that lists record retentions schedules for Individual State Agencies (scroll down to the IDEM Record Retention Schedules). IDEM programs that store records in-house, in the IDEM Virtual File Cabinet (VFC), or in federal databases should include such information in the table.

Record the details of any specialize trainings taken by staff specifically in order to implement the QAPP being reported upon. (Delete the table, or leave blank if not applicable.)

Specialized Training (title/topic)	Training Materials Used	Date of Training (approximate)	Staff Receiving Training	Proof of Training

Use of the DQO (data quality objective) Process:
Based on the information proved at A.7.1., please identify here whether the DQO process, some other approach, or no other activity was used to address data variability. Briefly describe the option used, including details, as appropriate, about program use of the DQO process, laboratory development of the DQIs used, or the citations needed to review any documentation incorporating risk assessment to adjust action/no action decisions in lieu of using the DQO process to characterize data variability

QAPP Implementation *(check one)*:

☐ The QAPP was implemented as written.

Or

☐ It was not possible to implement all steps of the QAPP as they were documented therein, and while the changes to implementation did not result in a revision to the QAPP itself, changes to the conditions assumed by the QAPP or the manner in which it was implemented did occur.

Please document here all modifications to implementation of the QAPP acknowledged immediately above. Add text…..

(For example, describe how field implementation may have varied from the QAPP (as written. Record/summarize any changes/improvisation that may have occurred in the field and/or during subsequent review of lab packets and raw data.

Document any correction factors that may have been developed during the data acceptance process that allowed the data to still be of use, and the rationale for those corrections factors.)

If the QAPP implementation recorded herein was conducted while following a program QAPP, are there any 'observations or "lessons learned" from this implementation that could justify revisions to the QAPP prior to its further use at a different location or timeframe?